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THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

Volume XXVIII Feb. 15/Mar. 1, 1944 Number 4/5

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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LATE BLIGHT ON EGGPLANT IN FLORIDA

A. L. Harrison and D. G. A. Kelbert

Late blight caused by Phytophthora infestans was observed to be causing considerable damage on eggplants at Fort Myers on February 4. It has been reported previously as occurring on eggplants but in most instances the reports merely state that the organism will infect eggplant. However in this case, it was serious enough to be of economic importance. The farmer reported that he had lost 25% of his crop and apparently most of the loss was due to P. infestans although Phomopsis vexans was also present.

No late blight lesions were observed on the foliage; all the infection was confined to the fruits. The first symptom was a roughening and blistering of the epidermis, which may be confined to a small area or cover a large portion of the surface of the fruit. The blisters are easily broken. Affected fruits when cut reveal the same type of decay that is characteristic of late blight on tomato fruits.

Diseased fruits when placed in a moist chamber yielded almost pure cultures of P. infestans within a few hours.

P. infestans was also causing considerable damage to potatoes and tomatoes in the same field. However, it was not observed on some peppers which were growing adjacent to the eggplants and tomatoes.

VEGETABLE CROPS LABORATORY, FLORIDA AGRICULTURAL EXPERIMENT STATION, BRADENTON, FLORIDA

LATE BLIGHT ON POTATO AND TOMATO, AND OTHER DISEASES OF SOLANACEOUS CROPS IN THE LOWER RIO GRANDE VALLEY OF TEXAS

Stuart M. Pady

Late blight has been found on potato tubers from the experimental plots at the Station here. The rot appeared about 3 weeks after harvesting. In a field being dug near Santa Maria late blight was found on potatoes left in the field. Adjacent to this field the spring crop is just coming through the ground.

Many additional tomato fields affected by late blight have been found throughout the Valley since the previous report (PDR 28 (2): 41, Jan. 15). Although the vines are dead, the green fruit lying on the ground manifests the disease. A total of 25 fields have been found with blight. Three other fields are doubtful, and 2 others were negative. Since the new crop now in the seedling stage is often adjacent to these old fields, there is great danger to the new crop.

The presence of late blight on tomatoes, with lesions found sporulating January 30, in the potato growing section around Los Fresnos constitutes a further hazard which must be watched carefully.

Sclerotinia sclerotiorum was found producing sclerotia on tomato fruit in the same field near Los Fresnos.

Peppers in one field near Santa Maria showed considerable leaf spotting due to Cercospora capsici. In another field near Santa Maria from 80 to 90% of the plants were infected with mosaic (virus), and rootknot (Heterodera marioni) was present on every plant examined.

EMERGENCY PLANT DISEASE PREVENTION PROJECT. Report on diseases observed during January.

DISEASES OF SOLANACEOUS CROPS IN SOUTHERN FLORIDA

R. A. Hyre;

From January 17 to 22 a survey was made in the vicinity of Belle Glade. A small grower at Pahokee requested help on an apparent disease that worked from the top down on his Eggplants. A loss of 65% was estimated for the 3-acre field seen. The grower stated that the same trouble occurred in other nearby fields. From specimens that were sent to him for diagnosis, Dr. W. W. Ray reported later that the cause was Verticillium albo-atrum. This was the first time the grower had seen this type of manifestation of this disease, and indeed, it is a very interesting one. Phomopsis vexans was also causing a small loss in the field.

Late blight, scab [Actinomyces scabies] and nematodes were the chief diseases affecting Potatoes in this area. A government inspector at one of the packing houses estimated from 5 to 6% scab, with from 1.5 to 2% loss from culls, in the 3000-acre Bliss Triumph potato crop, which seems a reliable estimate. On cull piles, growth cracks, some Rhizoctonia, a small amount of soft rot, and considerable worm injury, were seen in addition to scab and nematodes.

From January 24 to 29 the survey was made in the Hollywood-Dania area of the Southern East Coast, with emphasis on Tomatoes. Dania is the center of a sizeable green-pack tomato industry. Over 300 acres of tomatoes were surveyed. Early blight (Alternaria solani) was a problem only in an occasional field. Late blight was responsible for an estimated 5 to 8% loss in 5 acres. From a trace to 3% of Fusarium wilt [Fusarium bulbigenum var. lycopersici] was found in 33 acres. Stem rot (Sclerotinia sclerotiorum) was found causing a slight loss in 15 acres near Kendall, south of Miami, on marl soil.

The real menace to the Dania tomato crop this year is mosaic (virus). Infection varied from a few percent up to 75% of the plants affected for 80% of the acreage surveyed. The average would be 25 to 30% infection with an estimated loss of 15 to 20%. The disease seemed to be worse this year than usual and several farmers stated that at the present rate of loss it will put them out of business. "Fern-leaf", and "shoestring" (cucumber mosaic virus) symptoms and much necrotic spotting of the leaflets occurred. The fields are often weedy. Adjacent peppers frequently had mosaic. In one tomato field the row next to pepper plants with 40% mosaic had 96% mosaic, while a row 150 feet from the peppers had 37% mosaic. Some of the fertilizer used contained ground tobacco debris.

Fifteen acres of Eggplants west of Dania had a 15 to 20% loss from Phomopsis stem canker, and another 6 acres had a 20% loss from the same disease. A trace of Sclerotinia stem rot was found on a sand soil in one field west of Dania.

Of the 55 acres of Peppers observed in this region, Cercospora capsici leaf spot was causing a slight amount of defoliation on 13 acres. The most important pepper disease encountered was mosaic, which varied from about 2% to 45%, with an average of 25%, on 35 acres east of Dania. The percentage loss would be about the same as the amount of infection.

A survey was made in the Pompano area of the East Coast region from January 31 to February 5. About 130 acres of Peppers, mostly in small plots, were observed. The crop was generally quite free from diseases although it was considerably delayed by earlier cool weather. Cercospora leaf spot occurred generally but was causing serious defoliation in only a few cases. Bacterial leaf spot (Xanthomonas vesicatoria) was seen in only one field. A trace of Sclerotinia sclerotiorum was observed. In 7 acres up to 10% of wilt, thought to be due to Bacterium solanacearum, was noted. Only a trace of mosaic was seen in the Pompano area. This is in contrast to the eastern Dania area where mosaic was severe.

The 75 acres of Tomatoes seen were quite free from diseases. In contrast to the Dania area mosaic was found to be a problem (35% mosaic present) in only one 2-acre plot. Several bushels were found to be discarded at the Pompano State Farmers' Market because of late blight fruit infection.

In the 25 acres of Eggplants observed in this area, Phomopsis stem canker and fruit rot was resulting in losses up to 75%, averaging 20 to 25% for the acreage seen. Several growers stated that the seedlings showed stem cankers at the time of setting in the field.

During the period February 7 to 11, the survey was continued up the Lower East Coast, extending from Boynton to as far north as Vero Beach. Small plantings were the rule in this area, the total acreage observed being relatively small.

In the 250 acres of Peppers observed, Cercospora leaf spot was the most prevalent disease. It was defoliating the plants at various places where no control measures were employed. Generally, however, the use of a copper fungicide and the prevalence of unseasonably dry weather combined resulted in little economic loss. The disease was found on bell, Italian, and hot peppers. Bacterial leaf spot was found throughout the area visited and was causing defoliation in some areas, but, on the whole, the loss to date would not be more than a few percent.

Much of the Tomato acreage around Fort Pierce had already been harvested and a spring crop was planted. A considerable amount of anthracnose (Colletotrichum phomoides) was present on the ripe fruit remaining in the field, but the disease is of little economic importance in a green-pack area. At a Boynton packing house the fruit was very clean, with only a trace of bacterial spot. At West Palm Beach a 2-acre plot showed from 15 to 20% loss from late blight. A small patch of potatoes nearby had blighted earlier and the blight on tomatoes started at this side of the plot. A trace of Fusarium wilt was present in this plot.

About 250 acres of Eggplants were surveyed. Losses from Phomopsis stem canker and some fruit rot occurred generally and amounted to from 10 to 100%. West of Stuart one farmer saved 25 pounds of seed from last year's crop. He sliced the eggplant fruits into 2-inch thick slices, always throwing out the rotten ones. The untreated seed was planted in a new seedbed. Plants for about 200 acres were taken from this bed. Subsequent losses were heavy, some fields being disked up. One farmer estimated the total loss from this diseased seedbed at $10,000. The farmer who owned the seedbed does not expect to grow eggplants next year.
EMERGENCY PLANT DISEASE PREVENTION PROJECT

OTHER REPORTS ON TOMATO DISEASES

TOMATO DISEASES IN NORTHERN FLORIDA: Only one tomato planting was seen, of 1/4 acre at Sanford. The plants showed considerable leaf spot from early blight. Leaf mold (Cladosporium fulvum) also occurred on the leaves of some plants. Some fruit loss from ripe rot (Phoma destructiva) occurred at the stem ends, particularly on fruits showing cracking. -- Arthur S. Rhoads, Emergency Plant Disease Prevention Project. January 30 - February 5.

GREENHOUSE TOMATO DISEASES IN INDIANA: During the week ending February 12, vegetable crops in greenhouses in the vicinity of Terre Haute and Indianapolis were examined in company with C. T. Gregory of the Purdue University Agricultural Experiment Station. Cucumbers and tomatoes in greenhouses covering 30 acres near Terre Haute appeared free from diseases. In a second greenhouse establishment near Terre Haute tomato plants of the first crop were being removed, and the soil was being cultivated preparatory to planting the second crop of tomatoes. Many of the old plants were infected with mosaic and single-virus streak. The young tomato plants that will be planted in these houses appeared to be free from viruses. Twenty greenhouses were visited in the vicinity of Indianapolis, where lettuce was the principal crop. In many of the greenhouses young tomato plants for the spring crop were being transplanted. In one greenhouse about 1% of the young tomato plants were infected with mosaic. -- R. C. Baines, Emergency Plant Disease Prevention Project.

FROST INJURY TO TOMATOES IN THE IMPERIAL VALLEY OF CALIFORNIA: Frosts occurred between January 9 to 12, which caused severe damage to bearing and non-bearing tomato plants. Tomatoes grown under "brush" protectors (made of arrow-weeds and paper) were equally as severely damaged by the frost as those growing in the open fields. Growers estimated at least 25% of the tomatoes ready for "green wrap" shipment were damaged. -- E. W. Bodine, Emergency Plant Disease Prevention Project.

SCLEROTINIA AND OTHER DISEASES OF LETTUCE AND OTHER WINTER VEGETABLES IN THE SALT RIVER VALLEY, PHOENIX, ARIZONA

Wm. G. Hoyman

From November 30, 1943 until February 4, 1944, a disease survey was made of approximately the entire acreage of winter vegetables grown in the Salt River Valley, Phoenix, Arizona. As in the past, lettuce continued to be the major truck crop. According to the Department of Agricultural Economics, University of Arizona, the acreages of fall-planted vegetables were as follows: lettuce, 11,519; broccoli, 1,658; cauliflower, 1,433; carrots, 1,272; cabbage, 891 and endive, 479. Figures were not obtainable for spinach, beets, turnips, chinese cabbage and celery; these comprise but a small acreage.

Sclerotinia sclerotiorum has caused severe losses to Lettuce growers in some previous years[1]. The present survey indicated the losses caused by this pathogen were small but more than the combined losses of the other 5 lettuce diseases. The losses varied from very slight to 3.5% in all but one of the 75 plantings having this disease. In one planting, 37.5% of the plants were infected with this soil-borne fungus. Excessive irrigation increased the infection in this one instance. Big vein [virus] was observed in approximately 25% of the plantings. Its occurrence ranged from very slight to 12.3%. Bacterial slime (Erwinia carotovora) was observed in 23 plantings. In only 6 instances was the infection over 1%; the highest was 8%. Of minor importance was tipburn [nonparasitic]. During the forepart of the survey, when warmer weather prevailed, it was observed in five plantings. A very slight amount of mosaic [virus] was found in one 18-acre planting.

In contrast to lettuce, Broccoli was found to be remarkably free from diseases. Not until most of the acreage had been surveyed was mosaic observed doing very slight damage in one 45-acre planting. No other diseases were observed on this cruciferous crop.

Sclerotinia sclerotiorum was found in 2 of several Cauliflower plantings. The leaves on 3% of the plants were infected in one 20-acre planting being grown for market purposes. In another planting, a grower had left one acre of Danamerica for seed production. Knowing that Sclerotinia sclerotiorum was present in this field, he had removed all the lower leaves and withheld irrigation. In spite of these precautions, 20% of the stems were infected.

Carrots were the only vegetable observed that was free from any disease. Sclerotinia sclerotiorum did slight damage in a field of seed carrots during the spring of 1943, but the presence of this fungus on the regular crop was of no concern during the survey period indicated above.

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[1] J. G. Brown and Karl D. Butler. Sclerotiniose of lettuce in Arizona. Univ. Ariz. Agr. Exp. Sta. Tech. Bul. No. 63, 1936.

The only disease observed on Cabbage was that caused by Sclerotinia sclerotiorum. It was observed in 7 plantings doing slight damage.

The manner in which Endive grows makes it very susceptible to Sclerotinia sclerotiorum. The damage to this crop was greater than to any of the others affected by this pathogen. The greatest loss (57%) was observed in one 10-acre field. The possibility was favorable for further infection before the crop was harvested. Bacterial necrosis of the leaves was observed as doing very slight damage in one 40-acre planting. The organism causing this infection was not identified.

Diseases of the small-acreage crops were as follows: a species of Fusarium was consistently isolated from spinach causing very slight and slight losses on 3 and 8 acres respectively, and Peronospora effusa was causing moderate infection on 1.5 acres; Cercospora beticola was causing infection on 28 acres of Beets; Erysiphe polygoni was causing very slight infection on 5 acres of Turnips; on Chinese Cabbage, Sclerotinia sclerotiorum was causing slight loss on 1.5 acres and Erysiphe polygoni was causing very slight infection on 1 acre of the same crop; Septoria apii was causing slight infection on 17 acres of Celery.

The observations recorded during this survey leave little doubt but what Sclerotinia sclerotiorum caused the greatest losses to winter vegetable growers of any disease present in the Salt River Valley. This soil-borne pathogen has become established throughout most of the valley. Although crop rotation is practiced as a control measure, the number of non-susceptible winter vegetables is very limited. For this reason, this disease has been and probably will be one of the most serious problems facing the growers of winter vegetables.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

(N.C., Fla., La., Tex, Ohio, Ind, Calif.)

REPORTS ON DISEASES OF LETTUCE, ENDIVE, AND ESCAROLE

LETTUCE SEED BED SURVEY IN NORTH CAROLINA: (In Pender and New Hanover Counties with Don Ellis, Vegetable Pathologist, North Carolina State College, January 31 to February 5). Transplanting of lettuce seedlings has started in the lettuce-producing area, near Wilmington, North Carolina. Most growers have not yet started to transplant, but those lucky enough to have plants large enough were taking advantage of the ideal weather last week.

Many growers were visited and all had 4 to 5 times more lettuce planted than they would need; this is their way of insuring against total loss. The plantings are staggered; any one planting, with a good stand, is enough to plant their entire acreage. Last year, however, even though there is considerable trading and lending of plants by the more fortunate to the less fortunate, many growers had to import transplants from South Carolina. This was due entirely to the great amount of damping-off that occurred in seed beds last year.

Post-emergence damping-off probably caused by Pythium debaryanum was severe this year in almost every seed bed planted with non-treated seed.

The contrast between treated and non-treated plantings in those seed beds where part of the plantings were treated was the difference between a

good stand and a stand so poor it was doubtful if any plants could be used. In some of the beds in which treated seed had been planted a too thick stand resulted. Some post emergence damping-off probably caused by Rhizoctonia solani was beginning.

This is the most devastating disease in lettuce seed beds, destroying whole beds in a very few days if the weather is right.

In New Hanover County several growers plant lettuce without a cover. Of these, 2 growers were visited, one of whom had already plowed up his entire planting as a complete loss. The other planting was almost completely destroyed by what was probably Rhizoctonia damping-off.

In spite of the obvious advantages, very few growers treat lettuce seed, probably not more than one in 10. Much of the loss is caused by unwise location of the seed bed, in old gardens, etc. but many do not even move the bed each year.

It is too early to tell the extent of losses this year; perhaps in the next visit to the area a more complete estimate of damages can be made. If good weather holds losses may still be relatively light. -- R. E. Atkinson, Emergency Plant Disease Prevention Project.

SCLEROTINIA ON LETTUCE AND ESCAROLE IN NORTHERN FLORIDA: Lettuce plantings totaling 53 1/2 acres at Sanford and 7 3/4 acres at Oviedo were examined in considerable detail since many of these were more or less severely attacked by lettuce drop (Sclerotinia sclerotiorum), which was the only disease found. The worst case seen occurred in a 5-acre planting in a basin-like area at Oviedo, where trouble had been experienced with the land becoming too wet from clogging of the tile lines used for subirrigation and drainage. This grower, who was just finishing harvesting what was left of the crop, claimed to have sustained a loss of 25% of his crop, or between 2,000 and 2,5000 crates, with the market price at $4.50 per crate. The disease was most destructive in the lower portion of the field, where nearly all the crop was lost. The trouble was said to have begun following the formation of 1/4 inch of ice on January 22. No doubt the failure of the tile lines to function properly contributed greatly to the development of this destructive disease, but in another planting of 2 1/4 acres visited near Oviedo, where the plants had largely been cut recently, an average of 25% of the plants was observed to show drop on land that unquestionably was well drained. No evidence of this disease was observed in another 1/2-acre planting at Oviedo.

Lettuce drop occurred to a greater or less extent in all the lettuce plantings examined at Sanford, with the exception of one recently set 3-acre planting. A fairly mature planting in which some cutting had been done showed an average of 20% of the plants attacked. Plantings that were heading showed an average of 1% of the plants attacked in one of 5 acres and 14% in another of 8 acres, while on a third it was estimated that the attacked plants averaged 30% in one tract of 15 acres and 40% on an adjoining 5-acre tract where the drainage had not been so effective. In another planting of 1 1/2 acres just beginning to head the number of attacked plants averaged 2%, while in a 5-acre planting not even beginning to head an average of 29% of the plants were attacked. In the older plantings it was obvious that the disease had been active for some time.

Two seedbeds, each 3 X 230 feet, were free from diseases, the plants being quite old in one.

Escarole plantings totaling 39 1/2 acres at Sanford and 7 acres at Oviedo were given considerable attention as these also showed drop (Sclerotinia sclerotiorum) in most cases, though this crop appears to be much less susceptible to this disease than lettuce.

In a mature planting of 1 acre at the farm in Oviedo where this disease caused an estimated loss of 75% in an adjoining 5-acre planting of lettuce it was estimated that 20% of the escarole plants were attacked, the disease being most prevalent on the lower land. In another 6-acre planting at Oviedo the plant loss from this disease averaged about 1%.

At Sanford it was estimated that the disease had attacked 1% of the plants in 2 plantings of 2 1/2 and 1 1/2 acres, respectively, and that on another long, narrow planting of 5 acres the disease occurred in about 1% of the plants scattered through the east half but appeared to be absent on the west half. In 5 other plantings totaling 17 acres only from 1 or 2 to occasional scattered plants were attacked. No evidence of this disease was observed in 3 other plantings totaling 13 1/2 acres, 2 of which were young. Isolations by Dr. George F. Weber from specimens of diseased plants sent from one field at Sanford yielded both Sclerotinia and Rhizoctonia. No other diseases of this crop were observed. -- Arthur S. Rhoads, Emergency Plant Disease Prevention Project. January 30 - February 5.

SCLEROTINIA ON LETTUCE AND ENDIVE IN SOUTHERN LOUISIANA: In the only field, about 5 acres, of endive seen, most of the plants were infected with Sclerotinia sclerotiorum and an estimated 5% were totally destroyed.

In a large field of mature lettuce, about 3 acres, observed in Plaquemines Parish, an estimated 15 to 20% of the plants were completely rotted by Sclerotinia, and a large proportion of the remaining plants were infected by apparently the same fungus. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. January 30 - February 5.

SCLEROTINIA ON LETTUCE, ENDIVE, AND ESCAROLE IN THE RIO GRANDE VALLEY OF TEXAS: Drop was found causing slight damage in an endive field near Santa Rosa, and was estimated to be causing 4% loss in a field of escarole south of Santa Rosa. In a field of lettuce near Santa Maria drop is causing 1 to 2% loss at present, but is spreading. A lettuce field at Elsa showed extensive damage with 40 to 50% of the heads infected. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

TOXIC SOIL INJURY TO LETTUCE IN AN OHIO GREENHOUSE: A lettuce crop examined in a greenhouse covering 6 acres near Cleveland showed several areas where plants were either killed out or had made little growth. This was found to be due to somewhat unusual circumstances. The preceding lettuce crop had been planted in soil which was given a liberal application of manure but was not sterilized. In the spots where poor growth is now evident, numerous puff-ball fungi had appeared and the soil was full of fungous strands. Before the present crop was planted the soil was steam-sterilized. The fungus was killed but the soil where it had been is now toxic to the lettuce. -- M. R. Harris, Emergency Plant Disease Prevention Project. January 24 - 29.

GREENHOUSE DISEASES OF LETTUCE IN INDIANA: During the week ending February 12, 20 greenhouses in the vicinity of Indianapolis were visited in company with C. T. Gregory of the Purdue University Agricultural Experiment Station. Lettuce was the principal crop being grown in these houses.

In 65% of the greenhouses from a trace to 30% of the lettuce was infected severely with brown blight (a virus disease); in 3 greenhouses, respectively 2%, 15%, and 30% of the lettuce was infected and was unmarketable.

From a trace to 10% (average 1%) of the recently transplanted lettuce was killed or infected severely with Botrytis cinerea causing stem rot.

In one greenhouse 20% of the mature lettuce was affected severely by drop. From a trace to moderate tipburn (non-parasitic) and gray mold rot (Botrytis) occurred on the mature lettuce in most of the houses. -- R. C. Baines, Emergency Plant Disease Prevention Project.

DISEASES OF LETTUCE IN THE IMPERIAL VALLEY OF CALIFORNIA: During the period January 9 to 29 plant disease surveys were made throughout the Imperial Valley. At this season of the year environmental conditions apparently are unfavorable for the development and spread of most of the diseases attacking plants grown in this area.

A few scattered plants affected with mosaic (virus) were found in practically all lettuce fields visited. Also, only a few plants affected with big vein (virus) were found in most of the plantings, although in one 60-acre field, approximately 30% of the plants showed big-vein symptoms. Cottony rot or drop was found on only a few plants in some of the fields inspected.

During this period, several quite severe frosts occurred in the Valley. Frost discoloration of the plants was apparent in most lettuce fields, and much of the lettuce required trimming to make a desirable grade. According to the California Crop and Livestock Reporting Service as of January 15, a reduction in sizes may follow the frosts, with correspondingly lighter yields late this month and in early February. -- E. W. Bodine, Emergency Plant Disease Prevention Project.

(N.C., La., Tex., Calif.)

REPORTS ON DISEASES OF SPINACH

A ROOT ROT OF SPINACH IN NORTH CAROLINA: From January 31 to February 5 a survey of vegetable diseases was made in Pender and New Hanover Counties with Don Ellis, of North Carolina State College. One 20-acre field of spinach was observed in which, in spots aggregating 1/4 of the field, all plants had yellowed leaves, with even the young crown leaves fired at the margin and discolored. Many of these plants when dug up showed the tap root entirely rotted away. All showed some degree of root injury. In the greener parts of the field scattered plants were similarly injured. Although the winter was severe, this was not believed to be due to winter injury. Specimens have been sent to Dr. Leland Shanor for determination. -- R. E. Atkinson, Emergency Plant Disease Prevention Project.

SPINACH DISEASES IN NORTHERN FLORIDA: On January 31 and February 1 observations were made on vegetable plantings on muck soil at Zellwood, Orange County. Downy mildew (Peronospora spinaciae) [P. effusa], continued to spread in the 10-acre spinach planting where it was noted occurring on January 24. No attempt was made to salvage any of the spinach in the mildew-affected 17-acre tract remaining out of the 100-acre planting by another farm operator (see preceding issue PDR); it was disced in although $400 was offered for the crop as it stood in the field.

A 17-acre planting on an adjacent tract was characterized by a very poor and irregular stand, with numerous pallid, spindly plants, attributed to excessively acid soil. Ten acres of this tract that had become seriously damaged by cutworms were disced and reseeded. A light infection of downy mildew was found to have developed generally throughout the 7 acres of older spinach, and the disease was apparent on plants that had survived on the disced 10 acres. However, the disease had not made its appearance in the younger plants which were between 2 and 3 weeks old.

In another farm operation at a different point a 5-acre planting was found to show a moderate infection of downy mildew; 1 acre of this planting was being harvested 2 weeks earlier than it normally would have been because of the appearance of the disease. After cutting, the worst-affected leaves were stripped off the plants in order not to lower the grade too much. In a later planting of 3 acres, about 3 weeks old, downy mildew had just begun to make its appearance, but only a very few leaves were found to be infected.

Between February 2 and 4, vegetable plantings were examined in the Sanford area. A destructive leaf spot of spinach due to Heterosporium variabile was observed in a seedbed of one large plant grower in the Lake Monroe section of Sanford. This disease had caused an extensive spotting and blighting of the leaves, which peculiarly enough, appeared to have swept through the plants on one side of the 4-foot wide bed before attacking those on the other. Spinach is not ordinarily grown in seedbeds, but this grower thought he could sell some plants. The crowded condition of the plants as they became older no doubt favored the development of the disease. This appears to constitute the first record of the occurrence of this disease in Florida. -- Arthur S. Rhoads, Emergency Plant Disease Prevention Project.

ROOT DISEASE OF SPINACH OBSERVED IN SOUTHERN LOUISIANA: In the one planting of spinach observed, a 1-acre field in the upper end of Plaquemines Parish, most of the plants exhibited an unhealthy and unthrifty appearance. In spots there was considerable yellowing and wilting. Affected plants were somewhat stunted, and the tap root was rotted towards the tip; there were no secondary roots. On many of the tap roots and scars of secondary roots there were what appeared to be nematode galls, but no nematodes were seen in sections examined under the microscope. It was noted, in sections of tap roots, that the stelar portion, extending for even as much as 1 to 2 inches above the rotted part, was considerably blackened, and fungous hyphae were seen in the vessels. Cultures from diseased material are not yet ready for examination. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. January 30 - February 5.

SPINACH DOWNY MILDEW IN THE LOWER RIO GRANDE VALLEY OF TEXAS: Blue mold (Peronospora effusa) is present in practically all fields in the Valley and is causing much damage. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

DISEASES OF SPINACH IN THE TEXAS WINTER GARDEN REGION: 1285 acres of spinach were examined during the period January 25 to February 7. Blue mold (Peronospora effusa) infections remain widespread and prevalent; however, the amount of loss has decreased during the past few weeks as compared with that observed during earlier surveys. An infection of nearly 100% near Crystal City, Zavala County, and another of nearly 25% near Uvalde, Uvalde County, were the most severe attacks observed.

White rust (Albugo occidentalis) was observed near Batesville and Crystal City in Zavala County, and near Eagle Pass and El Indio in Maverick County. Nearly all of the plantings surveyed in Maverick County showed white rust, infection ranging from a trace to nearly 50%. Considerable loss resulted from nearly 100% infection at Batesville.

Leaf spot (Heterosporium variabile) has become more prevalent and widespread during the past few weeks, although the disease is usually localized in affected fields. Infection ranges from a trace to nearly 100% in parts of affected plantings.

Specimens of wilted spinach plants collected near El Indio were infected by a fungus identified as Fusarium spinaciae by Dr. W. W. Ray and Dr. D. A. Preston.

Plants infected with the aster yellows virus were observed in most plantings examined but their number was considerably less than was noted in previous surveys. Aster yellows caused a loss of nearly 5% near Uvalde, and nearly 15% in a large planting near El Indio.

Curly-top (virus) infected plants were observed in various fields, in each instance in relatively few numbers. In no case was the loss more than 1%. -- Howard W. Larsh, Emergency Plant Disease Prevention Project.

SPINACH DISEASES IN THE ROBSTOWN AREA OF TEXAS: During the last week of January a survey was made covering approximately 1000 acres of spinach in the Robstown area (San Patricio and Nueces Counties on the Gulf Coast) to ascertain the presence and extent of diseases. The spinach in this area had been surveyed the latter part of November by Dr. G. M. Watkins, who observed at that time very little white rust and no blue mold (PDR 27 (24): 678. Dec. 1, 1943). Apparently continued damp and cloudy weather has been a factor facilitating the spread of infection of both blue mold and white rust, since both diseases were found in abundance at this time.

Blue mold (Peronospora effusa) had been active in December and early January, and had caused considerable leaf reduction in many fields. It was found in all fields, although in most places it was apparently inactive, with the exception of a few fields of young plants. The average loss as of January 25 is estimated at 1%.

White rust (Albugo occidentalis) had developed during December and January into one of the major factors reducing the marketable crop. Infection ranged from 1 to 100% of the plants, and in several instances the spinach had been so badly damaged that it was plowed under without any at-

tempt at harvest. About 150 acres had been turned under up to the end of January. The average loss to growers of spinach in this area will approximate 8%.

Both blue mold and white rust were less destructive on the flat leaf types of spinach, and seemed less intense on the curly leaf types having the more upright habit of growth. White rust seemed more active where the plants were sown thickly, as compared to fields where the plants were better spaced. One grower had observed that where his present acreage overlapped onto land which had produced spinach last season, the plants on the old land were the first to show white rust, indicating that the disease organism was still present, and able to infect the new crop. -- George E. Altstatt, Emergency Plant Disease Prevention Project.

WET WEATHER INJURY TO SPINACH IN THE GALVESTON AREA OF TEXAS: A field trip was made January 24-26 to examine winter vegetables in Galveston and Fort Bend Counties. The weather in that area has not been especially favorable for crops this season. During November, December, and January (up to January 25) 27 inches of rain fell at Alta Loma, Galveston County, according to Dr. M. J. Janes, Entomologist, of the Texas Agricultural Experiment Station field laboratory at that location. Drainage is slow in those flat coastal lands and fields have been flooded or soils water-soaked much of the time during the season. A 5-acre spinach field at Sugarland, Fort Bend County, showed no disease except numerous irregular soft-rot spots in the lower leaves which I think resulted from prolonged drowning of the field. Several tons of spinach were examined in trucks and hoppers at the canning plant of the Prison Farm at Sugarland. No diseases were seen. -- G. M. Watkins, Emergency Plant Disease Prevention Project.

LEAF SPOT AND A PHYTOPHTHORA ROOT ROT OF SPINACH OBSERVED IN CENTRAL CALIFORNIA: Leaf spot (Heterosporium variabile) was doing slight damage in one large field of spinach observed in Santa Clara County during the week ending January 15.

In the vicinity of Salinas during the following week, a root rot was found in a wet area at the end of one large field. Practically all the plants in this area were affected. The tap roots were rotted off about 1 to 2 inches below the surface of the ground. Numerous isolations from these diseased roots yielded pure cultures of a Phytophthora, of an as yet undetermined species. -- Horace L. Barnett, Emergency Plant Disease Prevention Project.

(N.C., Ga., Fla., Ala., Miss., La., Tex., Ore.)

REPORTS ON DISEASES OF CRUCIFEROUS CROPS

NORTH CAROLINA: In Pender and New Hanover Counties, January 31 to February 5, the only diseases prevalent on collards were mosaic (virus) and downy mildew (Peronospora parasitica), neither of which was of economic importance. Powdery mildew (Erysiphe polygoni) was found in trace amounts on turnips. No diseases were observed in several fields of

Scotch and Siberian kale. -- R. E. Atkinson, Emergency Plant Disease Prevention Project.

GEORGIA: A 60-acre field of cabbage grown for plants observed at Tifton, January 24, showed 100% downy mildew. The loss to the grower will probably be nil since the demand for plants causes buyers to take anything. Severe loss may occur in the field after plants are set out. The plants were being pulled at this time. Cold weather had caused stunting but there was a good stand. -- John R. Jackson, Emergency Plant Disease Prevention Project.

NORTHERN FLORIDA: On muck soil at Zellwood, Orange County, January 31 and February 1, a total of 98 acres of Cabbage was examined; in 2 of the plantings totaling 58 acres, cutting was proceeding. In both of these plantings some scattered rotting of the heads was attributed to previous damage from cold and delay in cutting. Cabbage grown on muck soils is claimed to be more subject to this deterioration than that grown on other soils. No diseases were noted other than a slight general infection of the oldest leaves of many plants with downy mildew, but this disease appears to be of no consequence in the field.

One grower, who, when visited on November 12, had 50 acres of cabbage seedbed sown in drills in the field, reported that this planting had been lost due to cold weather, from temperatures reaching 25, 26, 27, and 30° F. on 4 consecutive mornings. This was an especially serious loss, since the grower claimed to have had sale contracts for 2 million plants, and the cold weather killed them about a week before they would have been ready for marketing.

Another operator, who had 5 acres of cabbage seedbeds of different ages under cloth-covered A-frames, was found to be experiencing considerable trouble from downy mildew. His seedbeds were generally infected, although comparatively few plants showed serious injury as yet. The oldest plants were nearly ready for transplanting. The grower had just begun dusting with Spergon on the morning of my visit, but the dusting operation appeared to be very inefficient. A stream of dust was ejected down the middle of the rows and the light fog that went out on either side was quickly blown away by the wind. The disease was considerably worse in closely planted beds than in those where seeding was lighter. Growers usually plant far more seed than is required for their needs, since they anticipate considerable loss and ordinarily set out only the best plants and discard the balance.

No diseases were observed in 3 plantings of Turnips, largely grown for greens, nor in one planting of Collards, nor 2 of Radishes, in this region.

Vegetable plantings in the important sections at Sanford and Oviedo were examined on February 2, 3, and 4. Cabbage plantings totaling 80 acres at Sanford and about 500 acres at Oviedo were in general remarkably free from diseases. In most of these plantings a portion of the crop either had been harvested recently or was being harvested; in some younger plantings the plants had not yet begun to head.

Watery soft rot (Sclerotinia sclerotiorum) was found in a few fields at Sanford but the number of plants attacked in each case ranged from

only one to a few. This disease was most abundant in one planting on the west side of Sanford, where it occurred on both Savoy and the common green cabbage. Sclerotia of the fungus were observed on the outside of the rotted heads in a number of cases.

Evidence of downy mildew was observed frequently on the older leaves in many of the fields, both at Sanford and Oviedo.

In a few plantings a considerable number of the plants exhibited more or less pronounced symptoms of a soil deficiency, apparently of magnesium. The worst case of this trouble occurred in a 2-1/2 acre planting at Oviedo, where it was estimated that 5% of the plants were affected, many of them being exceedingly chlorotic and stunted. In this case fine-looking fields of celery occupied the adjoining land on both sides. At Sanford, a similar but less severe deficiency was noted on a considerable number of young plants in part of a 10-acre field, and on a few scattered plants in a young planting of about an acre.

Only one 5-acre planting of Cauliflower was seen, at Oviedo. The older half of the field had been cut recently. Some evidence of downy mildew occurred on leaves of plants from which the heads had been cut, and a trace of black rot (Xanthomonas campestris) also was observed in this part of the field. No diseases were observed on the younger plants in the other half of the field.

No diseases were observed in young plantings of turnips and chinese cabbage.

On February 5, 8 Cabbage plantings totaling 145 acres were examined in the Deep Creek section, in Volusia County. A total of about 250 acres of cabbage is said to be planted in this section. Some growers reported trouble from downy mildew in their seedbeds earlier and traces of the disease were observed on the older leaves in some fields, most of which were approaching maturity. No other evidence of disease was noted. -- Arthur S. Rhoads, Emergency Plant Disease Prevention Project.

SOUTHERN FLORIDA: Downy mildew continued to be the problem on Cabbage examined in the Belle Glade area, January 17 to 22. Nearly 50 acres of seedlings were definitely threatened with a 100% loss from the disease. On mature cabbage an estimated loss of 25% occurred in 40 acres being harvested. This field was dusted several times for downy mildew, but the plants were set very closely, often no more than 4 inches apart, which made effective dusting difficult. Some downy mildew was present in most fields but often it was not of great economic importance. Since this survey was made, Dr. G. R. Townsend reports that downy mildew has ceased to be of importance in this area.

Black leaf spot (Alternaria brassicae) [A. circinans] was widespread but was causing little economic loss in the Belle Glade section.

Of 30 acres of cabbage surveyed during the period January 24 to 29 in the East Coast region, 10 acres near Hollywood had small amounts of downy mildew and black rot. Twenty acres on a new muck area west of Fort Lauderdale appeared to be disease-free. -- R. A. Hyre, Emergency Plant Disease Prevention Project.

ALABAMA: A 9-acre field of Cabbage at Wetumpka was visited twice, first on December 6, later on January 13. The conditions observed on the 2 visits were entirely different. At the time of the first visit the cabbage, an excellent stand, was being cut, from 6 to 8 tons per acre already having been cut. There was a mild infection of downy mildew on the lower leaves, and a trace of bacterial soft rot [Erwinia carotovora]. Black rot was not found.

Before the second examination much of the cabbage was cut and marketed. A heavy frost caused much damage in late December. When visited the frost-damaged heads were rotting badly from bacterial soft rot. Black rot, not noticeable in December, had developed so far that little of the remaining crop was worth attempting to save. The owner blames the spread of the diseases and their damage on the cold weather. The amounts of disease observed on this second visit were: downy mildew, 80%; black rot, 60%; and bacterial soft rot, 10%.

Another, 2-acre field of cabbage grown for plants, which were being pulled, visited at Wetumpka in December showed a trace of downy mildew.

In Autauga County, December 6, a 50-acre field of Collards being cut showed a moderate amount of downy mildew with slight damage, and a 6-acre field of Kale that was ready to harvest showed a trace of leaf spot [cause not designated], with no damage. -- John R. Jackson, Emergency Plant Disease Prevention Project.

MISSISSIPPI: A trace of downy mildew was found on a comparatively large planting of Cabbage near Poplarville. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. February 6 - 12.

LOUISIANA: Black rot was common on older lower leaves of Cabbage observed near Bunkie (Avoyelles Parish) during the week ending January 29. Downy mildew was present also to a large extent on lower leaves, particularly near the ground. Damage due to these diseases appeared to be negligible. There were approximately 4 to 5 acres of the plants.

The week ending February 5 was spent in an intensive survey of the truck-farming area of southern Louisiana. A large acreage of mature Cabbage plants observed in St. James Parish showed a trace of Sclerotinia and downy mildew. At LaPlace, in St. John Parish, there was evidence of what appeared to be nitrogen deficiency in spots throughout several large fields. Mature plants in a comparatively small field in St. Bernard Parish were heavily infected with Alternaria brassicae [? A. circinans], with evident damage resulting.

The most outstanding diseased condition in Turnips (purple top White Globe variety) was observed in one field of 15 to 20 acres at LaPlace. In this field from 80 to 90% of the plants were somewhat stunted. The leaves varied in color from green to yellow to purple or bronze. The purpling apparently appears first on veins and in spots on the lower surface of green leaves, and eventually the entire leaf becomes discolored and dies back from the apical margins. This condition occurred throughout the entire field but appeared to be worse in localized areas. Roots of affected plants appeared to be healthy. The soil was rather sandy with fair drainage. The symptoms resembled closely those described for either nitrogen or potassium deficiency. -- Douglas C. Bain, Emergency Plant Disease Prevention Project.

LOWER RIO GRANDE VALLEY OF TEXAS: Broccoli. Leaf spot (Alternaria brassicae) [? A. circinans] is present in small amounts in many fields and in general damage is slight. In one old field north of Donna leaf spot was severe, occurring on the older leaves of over 70% of the plants. A few plants were found with partial infection of the head. Downy mildew was not abundant except in the field near Donna where it was severe on many of the younger plants. Yellows (cause not known, probably nutritional disorder aggravated by freezing injury) averages 1 to 2% in most fields in the vicinity of Weslaco.

Cabbage. Black rot is not conspicuous in most fields in the Valley, although it appears to be on the increase owing to recent wet weather. One field near Elsa had an estimated loss of 30 to 40%. Another field east of Los Fresnos is a total loss due to the combined action of this disease and black leaf spot. A young cabbage field in this same area is going down rapidly with seedling infection of over 50%. In some fields secondary infection of the upper leaves is present up to 5%.

Black leaf spot is highly variable. Most fields are relatively free while here and there the disease is present in abundance. Such fields become a total loss since the heads cannot be shipped (see under black rot).

Downy mildew was attacking young seedlings in a field north of Mercedes and apparently causing the death of many of them.

Drop (Sclerotinia sclerotiorum) is found in small amounts in a few fields, ranging from a trace to 4%, averaging less than 1%.

Cauliflower. Black leaf spot is present in small amounts in most fields. Black rot was found in a field near San Juan, causing considerable destruction. The infected heads were small, deformed, with heads twisted to one side. In a young field near Santa Maria early stages of downy mildew were found.

Mustard. Powdery mildew (Cidium sp.) was found in an old field south of Weslaco, causing widespread damage. A small amount of white rust (Albugo candida) was found in the field south of Weslaco, and a trace in another field near Santa Rosa. Downy mildew was found in a few plants in a field near Santa Rosa. A trace of drop was found in a thickly planted field near Santa Rosa. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

TEXAS WINTER GARDEN REGION: Cabbage, cauliflower, broccoli, and brussels sprouts plantings totaling 235 acres were observed during the period January 25 to February 7. Two diseases were apparent in all of the plantings surveyed: leaf spot (Alternaria brassicae) [?A. circinans], and downy mildew. In a 40-acre planting of cabbage northeast of Crystal City, Zavala County, considerable yellowing and defoliation of the lower leaves could be attributed to Alternaria infections.

In the 125 acres of turnips surveyed, plants affected by powdery mildew (Erysiphe polygoni) were observed in a large planting southeast of Uvalde, Uvalde County, and in a small planting at Winter Haven, Dimmit County. The fungus was prevalent in both cases but was causing very little loss. In the same plantings Alternaria leaf spot was causing slight to moderate yellowing and defoliation of the lower leaves. -- Howard W. Larsh, Emergency Plant Disease Prevention Project.

GALVESTON AREA OF TEXAS: A field trip was made January 24 to 26 to examine winter vegetables in Galveston and Fort Bend Counties. The weather in that area has not been especially favorable for crops this season. During November, December, and January (up to January 25) 27 inches of rain fell at Alta Loma, Galveston County, according to Dr. M. J. Janes, Entomologist, of the Texas Agricultural Experiment Station field laboratory at that location. Drainage is slow in those flat coastal lands and fields have been flooded or soils water-soaked much of the time during the season. Temperatures have been low enough at times to nip the foliage of cruciferous plants. The following diseases were observed.

Broccoli. A number of small patches were seen between League City and Dickinson, Galveston County. Downy mildew was observed in all plantings, usually causing moderate damage. The uniformly pale color of the foliage seen in all fields was probably the result of excessive soil moisture. Occasional black leaf spot lesions were noticed but were not causing practical damage.

Cabbage. Black leaf spot was present in several fields between Arcola and Sugarland, Fort Bend County, and at League City, Dickinson, and Alta Loma, Galveston County, causing slight damage. Downy mildew was present in all fields seen in the same localities. Nearly all plants were involved and the damage could be characterized as moderate to severe. Black rot was seen in only one field of about 8 acres between Arcola and Sugarland. In this case less than 1% of the plants were attacked. Yellows (Fusarium conglutinans) symptoms were observed in about 2% of the plants in a 1-acre planting at Alta Loma.

Cauliflower. A 1-acre planting was examined at the State Prison Farm at Sugarland. Black rot was well established on all plants and will render the crop a total loss.

Turnip. Several fields of from 2 to 8 acres were seen between Arcola and Sugarland. A trace of white leaf spot (Cercosporella albo-maculans) occurred in some fields. There was a general deterioration of the older leaves of many plants which is probably attributable to weather conditions unfavorable for growth. Specimens of such foliage, upon being examined microscopically later, showed no fructifications, spores, or other signs of disease. -- G. M. Watkins, Emergency Plant Disease Prevention Project.

OREGON: Cabbage (seed crop). Cabbage seed production has been started in a small isolated area in Josephine County where crucifers have not been grown previously. This area has a clean start and there is an evident desire to keep it free from disease as long as possible. "White blight" (probably Sclerotinia sclerotiorum) was reported to have occurred in a few plants of a seed plot last season and the entire plot was burned. The crop this season was set out late.

In Douglas County 2 types of seed-crop fields were noted. Some had obviously been intended for the seed crop when planted; no rot or disease was evident in these fields. Others had been planted for the cabbage crop but because of lack of market were being held for the seed crop. Some rot and saprophytes were evident on the heads in the latter fields but the rot was superficial and had not penetrated far.

In Lane County both early and late fields were observed. In this County the earlier plantings had been nearly covered by plowing earth over the plants. At this date the plants had kept very well. Rots were more prevalent on the covered heads. The outcome of risking injury to the uncovered plants by cold weather, on the one hand, or increase of the head rots by untimely periods of warm weather, on the other, will be of interest.

Chinese cabbage. A small planting was noted near Grants Pass. The plants showed dark flecks on the midribs and large veins, caused by a necrotic type virus (fly speck).

Cauliflower. In Douglas County virus diseases were noted to be quite prevalent in certain plantings. A vein-clearing type of symptoms was evident in varieties ready for harvest at this date. In later varieties, which had formed no evident head as yet, the symptoms were typical of those described for black ring. The percentage of infected plants ranged from about 5 to 20% in respective plantings. Infection by the vein-clearing type appeared to have occurred late in most instances and no obvious loss of the crop was noted. The severity of loss in functional leaf surface on the later varieties showing black ring symptoms will undoubtedly cause some reduction in yield of heads. -- Lytton W. Boyle, Emergency Plant Disease Prevention Project. January 25 - February 2.

(Ga., La., Tex.)

DISEASES OF ONIONS AND RELATED CROPS 1

DAMPING-OFF OF ONION SEEDLINGS IN GEORGIA: Farmers in the Tifton area engaged in the production of onion plants for transplanting are experiencing serious losses this year from post-emergence damping-off. Fields inspected had as high as 90% loss of plants from this disease. -- John R. Jackson, Emergency Plant Disease Prevention Project. January 21 - 24.

DISEASES OF SHALLOTS, GARLIC, AND ONIONS IN SOUTHERN LOUISIANA: In St. James Parish, in a very restricted area east of the Mississippi River, severe damage was done by the white-rot fungus Sclerotium cepivorum. On certain of the farms planting of these vegetables is being restricted because of the severity of the disease. White-rot was not found anywhere outside of the vicinity of Convent. Pink-root (Phoma terrestris) appeared to be quite common in areas east of the river, but was rarely found west of the river in Terrebonne, Assumption, and Ascension Parishes. In some fields (St. John Parish) the disease was found on all plants examined, and it appeared to be rather severe. A condition termed "yellow chlorosis" (cause unknown) is common in St. John and St. James Parishes. These plants are very conspicuous, due to their bright color of yellow. Other than this coloration, the plants appear to be normal. It was noted, however, that this condition was sometimes found on plants infected with the pink-root organism. The symptoms do not fit the description of the yellow-dwarf virus disease of onion. In some shallot fields (up to 4 acres) in St. James Parish, an estimated 10% of the plants were found to be rotted near the crown. The roots were healthy and normal. Maggots

were associated with this condition. Near Reserve (St. John Parish), 15 to 20% of the shallots in one large acreage had what appeared to be a neck-rot. The neck of the plants was considerably elongated, the bunches were somewhat adherent to each other, and the leaves were distinctly chlorotic. The outer layers of the tissues of the neck were soft and slimy. Colletotrichum and sometimes Botrytis were associated with this condition. Pink-root was also rather common on these plants. In practically all of the garlic observed there was a pale mottling in the leaves which suggested mosaic, but it was not established that this condition was mosaic. No downy mildew (Peronospora destructor) was found on this trip but the onion and shallot growers in Terrebonne Parish and vicinity anticipate considerable damage due to this disease. In the past years, mildew has been severe in this area. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. January 30 - February 5.

ONION DISEASES IN THE TEXAS WINTER GARDEN REGION: Onion fields totaling 265 acres were examined during the period from January 25 to February 7. Pink root was observed in plantings near Catarina, Big Wells, Brundage, and Winter Haven (Dimmit County). The amount of infection varied from a trace to nearly 65% in "seed beds." The disease was observed also on "dry sets" and on "green sets", infection varying from 1 to 15% in these plantings.

A yellowing of undetermined cause exists in several plantings of onions near Uvalde, Big Wells, and Winter Haven. The injured plants were scattered throughout the plantings. In the most severely injured area at Winter Haven nearly 10% of the plants were affected. The condition does not seem to be due to either nutritional or genetic causes; there is a possibility that the yellowing may be due to a virus infection. Affected plants were distinctly yellow and close examination revealed some degree of mottling. Most of the yellowed plants were of the same size as neighboring green plants at the same stage of development. -- Howard W. Larsh, Emergency Plant Disease Prevention Project.

DISEASES OF CARROTS REPORTED FROM TEXAS

LOWER RIO GRANDE VALLEY: Leaf blight (Macrosporium [Alternaria] carotae) is not severe in most fields in the Valley at the present time, although it is present in every field. Older fields have sufficient inoculum to cause great damage should wet weather follow. One field north of Donna was estimated to have lost 40% of its leaves, and a field near Mission was almost completely defoliated. An occasional plant affected by aster yellows (virus) is found in most fields. In a few fields the percentage infection was about 1%. For the Valley as a whole this disease is estimated to be present in trace amounts. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

WINTER GARDEN REGION: During the period January 25 to February 7, 804 acres of carrot plantings were surveyed. Aster yellows still remains the

most widespread and prevalent disease, although there has been a reduction in severity on younger carrots as compared to plants seeded in July and early August. The most severe infections were observed in Uvalde County where all the plantings surveyed during this period were seeded in July and early August. Losses in sections of large plantings reached 82%. Most of the carrots in these plantings were unmarketable.

County	Acres observed	Average infection	Range of infection
		%	%
Dimmit	436	26	1 - 62
Uvalde	125	61	31 - 82
Zavala	243	18	1 - 42

The insect vector, the aster leafhopper, was still prevalent in most of the plantings surveyed, although a slight reduction in numbers occurred during the past few weeks.

Leaf spot (Cercospora carotae) was observed near Uvalde (Uvalde County) and Carrizo Springs (Dimmit County); loss was negligible in all affected plantings.

Leaf blight (Macrosporium [Alternaria] carotae) was observed in all plantings surveyed. Considerable loss was observed in plantings near Crystal City (Zavala County), Winter Haven (Dimmit County), and Uvalde. Nearly 25% loss of foliage occurred in a 40-acre planting northeast of Crystal City. -- Howard W. Larsh, Emergency Plant Disease Prevention Project.

OTHER REPORTS ON VEGETABLE DISEASES IN WINTER TRUCK-GROWING AREAS, including Texas,

BEAN DISEASES IN ~~SOUTHERN~~ FLORIDA. Most of the beans in the Belle Glade area, visited during the week ending January 22, had been harvested by December 20, but those not harvested were nearly all frozen. Probably the largest loss in the area amounted to 600 acres frozen. A number of farmers stated that they had 100 or more acres frozen.

From January 24 to 29 a survey was made in the Hollywood-Dania area of the East Coast. No watery soft rot (Sclerotinia sclerotiorum) was found on a small acreage of beans seen west of North Miami Beach, west of Dania, and west of Davie, all on muck soil or a mixture of muck and sand. Small amounts were found in 25 acres in 4 different fields located just northeast and south of Kendall and southeast of Howard. This find, with previous data, shows the occurrence of this disease from south of Homestead to near Miami.

During the period January 31 to February 5 beans were observed from Fort Lauderdale to south of Delray Beach. Watery soft rot was observed throughout this area of the East Coast. It was found 2 miles west of West Dixie Highway and east of the Federal Highway. It generally occurred

in small amounts, only a trace in many places, but it was found in some abundance on some 40 acres in several locations west of West Dixie Highway. West of Boca Raton it was found in 400 acres and was severe in about 20% of that acreage. In spite of careful grading the beans trucked to New York City from this area brought 50¢ to 80¢ per hamper less because of this disease. This price reduction was not imposed at some other northern markets. The presence of the disease was correlated with wet soils; little was found in the drier soils.

Rhizoctonia solani stem rot was present to the extent of 1 to 3% throughout this area and was causing an estimated 10 to 12% loss on about 600 acres where the sand-soil was kept quite wet. About 1 to 3% of southern blight (Sclerotium rolfsii) occurred on these wetter sand-soils.

Rust (Uromyces phaseoli var. typica) was seen throughout this area, and was of economic importance and causing defoliation in some places. A general complaint was that sulfur, as applied here, does not prevent rust infection or keep the disease from spreading after it has become established.

During the period from February 7 to 11 the survey was continued up the Lower East Coast, extending from Boynton to as far north as Vero Beach. About 200 acres of beans were observed, mostly in the Boynton area. Small fields occurred at West Palm Beach and north to Vero Beach. A 25-acre field was being harvested west of Fort Pierce. These beans were all in dry sand and no Sclerotinia sclerotiorum has been found from Boynton to Vero Beach. A small amount of rust was seen, and from 3 to 5% loss from Rhizoctonia stem rot occurred in 50 acres west of Boynton. -- R. A. Hyre, Emergency Plant Disease Prevention Project.

BEAN DISEASES IN THE LOWER RIO GRANDE VALLEY OF TEXAS: Crown rot (Sclerotinia sclerotiorum) was found in an old field near Brownsville, where the fungus was producing sclerotia on above-ground parts of the plants. Southern blight was present on a few hold-over fall plants. Stuart M. Pady, Emergency Plant Disease Prevention Project.

BEET AND CHARD DISEASES IN THE GALVESTON AREA OF TEXAS: During the period from January 24 to 26 several small beet plantings were observed at League City and Alta Loma, both in Galveston County. A slight amount of leaf spot (Cercospora beticola) was found in all locations.

A 1/4-acre planting of swiss chard was examined at League City. The lower leaves had collapsed to the ground with soft rot, which was induced by flooding of the field. The younger leaves seemed unaffected except by a trace of leaf spot. -- G. M. Watkins, Emergency Plant Disease Prevention Project.

CELERY DISEASES IN ~~NORTHERN~~ FLORIDA: In the muck soil area at Zellwood (January 31, February 1) some trouble had been experienced with damping-off in 5 acres of celery seedbeds under cloth. However the stand appeared to be generally in excellent condition.

Plantings totaling 383 acres were examined at Sanford and 302 acres at Oviedo, February 2, 3, and 4. Harvesting was proceeding in a number of

cases. With very few exceptions the plantings were in fine condition and freer from diseases than usual. A number of large growers remarked that they had never had cleaner crops.

Early blight (Cercospora apii) was of no consequence whatever as the fields are sprayed at frequent intervals and this disease ordinarily is not bad during cool weather. It was found only in occasional fields and then only on the older leaves.

A small amount of mosaic [virus] was seen on leaves and stems of some plants in one field at Sanford.

Crack stem (boron deficiency) resulted in considerable loss in a few fields where applications of borax had not been made for 3 years. One field foreman reported that 80% of the plants were affected by this trouble in one 4-acre block recently cut. One grower reported that crack stem had ruined about 25% of the plants on a 5-acre block that was cut 10 days before.

Black heart [environmental] was found in the same field and losses from this trouble were said to be running about 25 crates per acre where production should ordinarily run 550 crates per acre. This trouble ordinarily does not develop until the advent of warm weather.

Even pink rot (Sclerotinia sclerotiorum) apparently was of rare occurrence as it was found only in occasional plants in a few fields where cutting was proceeding.

No evidence of late blight (Septoria apii) was observed.

In one field at Sanford an extensive elongated area occurred across the side along the road, in which the plants had made very little growth since they were set and were very chlorotic with the leaves dying back. A much more extensive area similarly affected occurred at the opposite, lower side of the field. About 20% of a 5-acre block was thus involved. In a field in the vicinity of Oviedo a large, irregular, elliptical patch and a few smaller ones were observed where the plants behaved similarly. This trouble is believed to have its origin in the land becoming too wet earlier from clogging of the underground tile lines.

In celery seedbeds of about 2 acres under overhead irrigation at Oviedo a slight loss from damping-off was noted in the lower ends of 3 beds where the soil was quite wet. The balance of the beds in general appeared to be in fine condition, as were also seedbeds of about 1 1/2 acres under overhead irrigation on one farm at Sanford. -- Arthur S. Rhoads, Emergency Plant Disease Prevention Project.

CELERY DISEASES IN SOUTHERN FLORIDA: Celery seen in the vicinity of Belle Glade, January 17 to 22, was nearly disease-free except for early blight, which was well-controlled in some fields but occurred in considerable amounts in others. A small amount of mosaic was seen in one field. A government inspector at one of the packing plants stated that very little diseased celery was showing up in the harvest to date.

The one 5-acre field seen near Kendall in the Hollywood-Dania area of the East Coast, January 24 to 29, was nearly disease-free, containing only a slight amount of early blight. -- R. A. Hyre, Emergency Plant Disease Prevention Project.

PARSLEY DISEASES IN ~~THE LOWER RIO GRANDE VALLEY OF TEXAS~~ and Texas: Stem rot (Sclerotinia sclerotiorum) was causing some damage (2%) in a field near Santa Rosa and was spreading rapidly. The tips of some leaves were brown, and an Alternaria was present, probably saprophytically. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

DISEASES OF PEAS OBSERVED IN ~~SOUTHERN~~ FLORIDA: Sixty acres were seen in the vicinity of Belle Glade, January 17 to 22. Less than 1% of Rhizoctonia solani stem rot occurred in 20 acres of young peas. A 35% loss from a root rot occurred in 40 acres at harvest time. From specimens sent to him, Dr. W. W. Ray isolated Fusarium solani var. martii f. 2. -- R. A. Hyre, Emergency Plant Disease Prevention Project.

DISEASES OF PEAS IN THE LOWER RIO GRANDE VALLEY OF TEXAS: In a field near Los Fresnos Ascochyta leaf and pod spot (Ascochyta pisi) is causing considerable damage with every plant showing a high degree of infection. The spots are characteristic: circular, tan in color, with brown margins and usually zonate.

Stem rot (Sclerotinia sclerotiorum) was very abundant on the vines in the same field near Los Fresnos, causing blackened areas in which the sclerotia were conspicuous. Often the ground below such plants is littered with sclerotia. The fungus is also causing a conspicuous leaf spot and pod infections are numerous. The field was almost a total loss. Beneath many of the vines the apothecia of the fungus were found arising from buried sclerotia.

Powdery mildew (Erysiphe polygoni) was beginning to appear in a few fields but was not causing any noticeable damage.

Yellowing (nutritional disorder?) was very conspicuous in several fields below San Benito, involving approximately 10% of the plants. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

and DISEASES OF SUMMER SQUASH IN ~~SOUTHERN~~ FLORIDA: A pocket of mosaic (virus)-affected plants occurred west of Hollywood. One grower made 2 light pickings off 60 acres; he estimated his loss from mosaic at $4000 to $5000. Another grower's estimated loss on 70 acres was $1500 to $2000. East of Hollywood mosaic was much less severe. Less than 3% was found on 40 acres, but 50% was found on one 3-acre tract.

Some mosaic was seen further north on the East Coast, west of Fort Pierce and near Vero Beach, but diseases were of little importance. One grower at Vero Beach with 12 acres of Yellow and Italian squash stated that this was his most disease-free year in his 15 years there. -- R. A. Hyre, Emergency Plant Disease Prevention Project. Reports January 24 - 29; February 7 - 11.

NEMATODE SURVEY IN FLORIDA

A. L. Taylor

During the period January 17 to January 29, crops in the vicinity of Belle Glade, Florida, were examined.

In this section, the principal soil type is the Everglades peat, which is composed almost entirely of organic matter and which has a very high water content. Small areas of sandy soil are found on the islands in Lake Okeechobee. The principal vegetable crops are beans, celery, potatoes, and cabbage, and there are small plantings of other vegetable crops. In addition, there are extensive plantings of sugarcane which is processed at a large sugar factory at Clewiston. The sugar company is experimenting with large scale plantings of sweetpotatoes and other plants for the production of starch, and with lemon grass and citronella grass for the production of essential oils.

At this time, comparatively few beans could be found in the fields, the fall crop having been killed by cold weather in December and only a small part of the fields replanted. Potatoes were being harvested. Celery could be found in all stages of growth from plant bed to harvest. Cabbage fields were in the early stages of harvest.

In a half-acre celery seedbed east of Belle Glade, less than 10% of the older plants had some rootknot (Heterodera marioni) and there was only a trace of infection on the younger beds. Small roots of some of the plants had numerous light brown lesions, often girdling the root. This was reported to have been much more prevalent earlier in the season. Nematodes of the genera Diplocapster, Aphelenchoides, Dorylaimus and Rhabditis were found in the soil around such roots. Of these, only Aphelenchoides is usually considered parasitic.

A 40-acre celery field had a light rootknot infection on about 10 acres. According to the farmer, there had been no noticeable damage from this cause on the field this year. He believed that the source of infection was the seedbed several years ago. The same field had been used for celery several years in succession.

Also east of Belle Glade on the Palm Beach road, a 10-acre celery seedbed was examined. No rootknot was found, but according to the owner, this soil was heavily infested 4 years ago. Since that time it has been kept in clean cultivation after the celery plants were harvested, and flooded during the summer. The flooding procedure has been to flood for about 2 weeks, drain and cultivate the land, and then flood once more. The complete cycle occupies about a month and is repeated two or three times during the summer.

Other celery fields examined had only a trace of rootknot with no apparent damage, although most farmers reported difficulty with this pest in the seedbed at some time in the past.

Red Bliss potatoes were examined on the packing belt at several packing houses in Belle Glade on several occasions. One lot was found of which about 5% were being discarded because of severe rootknot and there was probably another 5% with sufficient visible signs of infection to lower the grade. In some of the potatoes, the evidence of infection was very

marked, the principal signs being watery blisters on the tubers and conspicuous knotty outgrowths, sometimes more than 1/2 inch in diameter. These outgrowths were somewhat purplish in color. Microscopic examination revealed that the blisters contained numerous rootknot nematodes in the pre-adult stages, while the knots contained large numbers of mature females. Some of the heavily infected potatoes which were kept in the laboratory for two weeks became soft and flabby. The field, 3 miles north of Belle Glade, from which these potatoes came, was located and an examination made of the tubers remaining in the field. These had about the same proportion of infected tubers as those seen at the packing house. The field contained about 70 acres and the yield was about 200 bushels per acre or 14,000 bushels. The 5% loss due to culls discarded because of rootknot, amounted to about 700 bushels. The field was planted to snap beans last season and was allowed to grow up in weeds during the summer. The principal weeds were the giant Amaranthus (either retroflexus or hybridus) and Jew grass. Amaranthus growing in the field with the potatoes was often moderately infected with rootknot.

In a 40-acre field 6 miles east of Belle Glade, about 1% severe rootknot was found. Infection was found only in scattered hills, suggesting the possibility that the source was in the original seed pieces. An adjacent 40-acre field had only a trace of rootknot.

Other lots of potatoes examined on the sorting belt and in the field had no more than a trace of rootknot. Considerable amounts of scab, soft rot, and sunburn were observed.

On the same field where the heavily infected potatoes were observed, a 40-acre bean field was also heavily infected with rootknot. The farmer reported that growth and yield on this field had been poor. A 160-acre field of beans west of Pahokee was found to have some infection on about 75% of the plants examined, ranging from a few rootknot nematodes to a fairly heavy infection. No damage could be noted except on the heavily infected plants. Also infected with rootknot in this field were the spiny Amaranthus and the sunflowers which were planted in rows at intervals across the field to serve as a windbreak. Young beans collected from a field in the same vicinity had only a trace of rootknot. These beans had numerous large brown stem lesions, with which were associated nematodes of the genera Aphelenchoides, Cephalobus, and Acrobeles.

On one of the few sandy fields examined in this area (on Kreamers Island in Lake Okeechobee) a heavy rootknot infection was found on a high spot in a bean field. The plants in this spot were obviously weak and stunted.

Young English peas from Kreamers Island had nematodes of the genera Acrobeles, Dorylaimus, Aphelenchoides, and Diplogaster associated with blinded roots and dead plants.

A 40-acre field of English peas 3 miles north of Belle Glade had only a trace of rootknot with no apparent injury.

A 4-acre beet field 4 miles east of Belle Glade was found to have about 80% of the plants lightly infected with rootknot. Six acres of young lettuce and Chinese cabbage had about 50% infected plants. Twenty acres of mature escarolle had only a trace of rootknot. One corner of a 5-acre field of mature peppers had a few infected plants. Fifty percent of the plants in 3 acres of mature eggplant had a heavy rootknot infection. Two acres of bell peppers on an adjoining field had only a trace of rootknot.

Only a slight trace of rootknot was found in several cabbage fields. Ten acres of tomatoes at the end of harvest had about 10% of the plants moderately infected.

Rotted Easter lily bulbs from a small planting east of Pahokee contained large numbers of nematodes of the genus Rhabditis, all of which were in the rotted portion of the bulbs.

Through the courtesy of Dr. Bourne, of the U. S. Sugar Corporation, of Clewiston, a number of samples of unhealthy sugarcane, lemon and citronella grass, arrow root, tropical yam and edible canna were collected from the fields and experimental plots owned by that company. Dr. Bourne reports that little or no trouble with rootknot is recognized on sugarcane in that vicinity. (Mr. Stevens, sugarcane agronomist of the Everglades Experiment Station, says that, while rootknot is not uncommon on sugarcane, he has never seen damage unmistakably due to this pest in the Everglades.

No rootknot was found on the few sugarcane samples collected. Associated with diseased sugarcane roots were found nematodes of the genera Dorylaimus, Cephalobus, Acrobeles, Anguillulina, and Criconemoides. In some of the samples Criconemoides rusticum was very abundant.

Soil from around the roots of lemon grass (Cymbopogon citratus) and citronella grass (C. nardus) contained Criconemoides rusticum and Dorylaimus sp. Sweetpotato specimens had Acrobeles, Aphelenchoides, Cephalobus, Dorylaimus, and Anguillulina spp. in the surrounding soil.

Soil samples from around the roots of Canna edulis, tropical yam (Dioscorea sp.), and arrowroot (Maranta arundinacea) contained only a few specimens of Dorylaimus, Anguillulina, and Criconemoides.

In the samples from the U. S. Sugar Corporation the nematodes found were all what have been called "free living" forms, though it is probable that the Criconemoides, Anguillulina, and Aphelenchoides spp. at least, are actually ectoparasities of plants, feeding by piercing the root cells with their stylets. It is believed that the consequent injury to the plants may be of importance directly or may provide easy entrance for pathogenic fungi or bacteria.

A 20-acre experimental planting of Russian dandelion (Taraxacum koksagys) was examined for rootknot at the request of Mr. Arambert, of the Forest Service, in charge. No trace of infection was found on the young plants. Roots of sample plants examined had no lesions which might have been caused by nematodes. Soil around roots contained only specimens of Rhabditis and Acrobeles, usually considered to be saprophytic in habit. The experimental plantings are on soil which is being cultivated for the second year. Last year it was used for potatoes and during the summer it was flooded. Dr. Bair of the Everglades Experiment Station reports that considerable damage was done by rootknot on an experimental planting of Russian dandelion on the experiment station property last summer.

Methods practiced for control of rootknot by the farmers in this region are:

1. Avoidance of soil known to be infested, especially for the planting of the most susceptible crops. As new land or land which has not been cultivated for several years is fairly easy to find, this is practical to some extent.

2. Flooding is practiced by some farmers for such important areas as celery seedbeds. Because of the gentle slope of the land -- only about 2 inches to the mile in most of the area -- and an abundance of water, flooding is often very easy. Also flooding is thought to have a beneficial effect on the soil and to prevent subsidence to a certain extent. (Peat soil in this vicinity subsides at about the rate of one inch a year under cultivation. Already about half of the original depth of peat has disappeared.) While there is little direct evidence that any large proportion of the rootknot nematodes can be killed by flooding for a few months, it was pointed out by Dr. Bair that while the land is flooded it is not supporting a crop of wild host plants of the rootknot nematode, thus providing good conditions for the maintenance or increase of the nematode population. One good farmer reported that flooding could be combined with a cover crop of sesbania, which is normally a host of the rootknot nematode, without increasing the infestation. The sesbania is planted on the moist soil and allowed to reach the height of about 6 or 8 inches, which takes two or three weeks in early summer. It is then flooded to a depth of about 2 inches and kept flooded until fall. The sesbania will continue to grow under these conditions, but does not become infected.

It should be pointed out that flooding is not always practical in all locations in this area.

Here, as elsewhere in Florida, the farmers were found to be very much aware of the rootknot nematode and its potentialities for harm. Also, as elsewhere, the average farmer was found to be in possession of considerable misinformation on the subject. But every farmer could point out infested areas on his own farm or tell of past difficulties with rootknot.

Recommendations. - 1. Experiments on flooding for control of rootknot should be conducted. In these, the nematode population of flooded areas should be compared with areas not flooded but kept in clean cultivation, areas not flooded but covered by native weeds, areas not flooded but in summer cover crops, and areas flooded intermittently.

2. Cross inoculation experiments with strains of nematodes from all the principal crops should be conducted with the principal cash and cover crops.

3. Studies of the relationships of the so-called free living nematodes to diseases of sugarcane.

4. A thorough search for parasitic nematodes of sugarcane.

5. An educational campaign to acquaint the farmers with the nature of the rootknot nematode.

6. All of the above should be pointed toward practical large scale methods of controlling nematodes applicable under the special conditions existing in this region.

7. Experiments with chemicals for nematode control should be conducted on muck soil, including any substances which may be economically practical for use in this area.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

VEGETABLE STORAGE DISEASES IN NEW YORK (including quantitative data)

Leon J. Tyler

The following is a summary of observations made concerning vegetable storage rots in New York State during the period beginning about December 10, 1943 and ending January 27, 1944. Some tabulated data accompanies the discussion of cabbage, carrot, celery and onion rots.

Carrots. It is estimated that about 4000 acres of carrots, yielding better than 2 million bushels, were grown in New York State in 1943. Carrots grown for commercial purposes are mostly produced in Orleans, Genesee, Monroe, Wayne, Ontario, Nassau and Suffolk Counties. Large quantities of carrots produced in upstate New York are stored for later processing while most of those produced in Nassau and Suffolk Counties (Long Island) are marketed as a fresh vegetable.

Ten upstate cold storages, visited, housed about 174,000 bushels and 7 upstate common storages, visited, housed about 52,000 bushels (see Tables 1 and 2.). Cold storage carrots were mostly stored in crates or covered bushel baskets. Some common storage carrots were in crates and baskets while many were stored in bulk in bins. Tables I and 2 reveal some of the details of storage conditions.

Temperatures at which cold storage carrots were held ranged from 31 to 34° F. and the relative humidities ranged from 84 to 92%. Temperatures in common storages ranged from 36 to 45° F. and humidity from 88 to 92%.

As would be expected carrots in cold storage were keeping better than those in common storage. Total rot in common storage carrots ranged from 1 to 10% of the roots while the percentage of rotted roots in cold storage ranged from 0.2 to 2. Unusually few rotting organisms were not found and in general the species of rotting organisms present in common storage were the same as those found in cold storage. Organisms found causing storage rots were: Erwinia carotovora, Botrytis spp., Sclerotinia sclerotiorum and perhaps other Sclerotinia species, Fusarium spp., Rhizoctonia solani, Rhizopus spp. and Alternaria radicina [Stemphylium radicinum]. Sclerotinia, the soft rot bacteria, and Botrytis were the most destructive in that order.

Despite the fact that carrots were harvested under difficult weather conditions in many localities, and were very dirty when brought into storage, there was surprisingly little rot if the roots were stored in crates, baskets or bins and the storage rooms were well ventilated. Thus, the importance of scientifically planned and constructed storage quarters is emphasized.

Celery. About one and one-third million crates of celery (classified as late celery) are grown in New York State each year. Most of the celery is grown in upstate New York and almost one-half of the total is produced in Wayne County. Stored celery was mostly held in cold storage plants in Wayne and Monroe Counties. Only a small portion of the total remained in cold storage, in this area, in December.

Table 1. Carrots: Storage conditions and rots in cold storage in New York State, 1943-44.

Location	Amount stored (1000 bu.)	Storage conditions[c]				Percent of carrot roots affected[d]						
							Pathogens					
		Stored in:	Ventilation	Humidity pct.	Temp. °F.	Total	Erwinia carotovora	Botrytis spp.	Sclerotinia sclerotiorum and other Scl. spp.	Fusarium spp.	Rhizoctonia	Rhizopus
Albion	2.5	Crates	Good	84	34	0.5	0.1	0.1	0.3			
Savannah	30	Crates	Fair	89	32	2		0.5	1.5			
Newark	10[a]	Baskets & crates	Good	89	33	1	0.2	0.3	0.5			
Clyde	22	Crates	Good	85 to 90	32 to 34	1.5	0.3	0.5	0.7	tr.		tr.
Marion	5	Crates	Good	87	31	1.0		0.3	0.6		0.1	tr.
Albion	2[a]	Crates	Good	86	32.5		tr.		tr.			
Albion	4[a]	Crates	Good	87 to 90	31.5 to 32.5	0.2	0.05		0.15			
Medina	5.5[b]	Covered bu. bskt & sacks	Fair Fair		34 32.5	2.0	.3	0.7	1.0 0.3			
Webster	15[a]	Crates	Fair to good	92	33.0	0.3		0.1	0.2			
Fairport	78	Crates	Good	89 to 91	31.5 to 33.0	0.5	0.1	0.1	0.2	0.1		

[a] About 1/2 upland and 1/2 muckland grown carrots.

[b] Mostly California grown and stored in sacks.

[c] Crates and baskets usually stacked 5 to 8 layers high.
Ventilation: Good = Usually stored in open crates with ample spacing between layers and blocks of crates; air inlets and outlets were provided.
Fair = Usually stored in covered baskets or crates but not spaced well; air inlets and outlets provided.

[d] Crates of carrots selected at random and contents examined. Data in "Totals" column equals sum of data under "pathogens". *Alternaria radicina* not found.

[d] Crates of carrots selected at random and contents examined. Data in "Totals" column equals sum of data under "pathogens". Alternaria radicina not found.

Table 2. Carrots: Storage conditions and rots in common storage in New York State, 1943-44.

Location	Amount stored (1000 bu.)	Storage conditions				Percent of carrot roots affected[b]						
							Pathogens					
		Stored in:	Ventilation[a]	Humidity pct.	Temp. °F.	Total	Erwinia carotovora	Botrytis spp.	Sclerotinia sclerotiorum	Rhizoctonia	Rhizopus	Alternaria radicina
Rome State Hospital	0.2	Bulk	Very poor	90	38	10.0	2	3	4	0.5	0.5	
Seneca Castle	13	Bulk	Good	88	39	1.5	0.3	0.4	0.8			tr.
Seneca Castle	12	Crates & baskets	Fair	89	36 to 40	2.0		0.7	1.0	0.2	0.1	
Binghamton	6	Bulk	Good	92	40	1.0	0.2	0.4	0.4			
Binghamton	4	Bulk	Very poor	--	45	3.0	0.5	1.0	1.5		tr.	
Webster	5	Crates	Fair	--	39	1.5		0.5	0.7	0.2	0.1	
Fairport	11	Bushel baskets	Poor to fair	--	36.5	2.5	0.2	0.8	1.5			

[a] Ventilation: Good = Bulk carrots stored in well ventilated bins in well ventilated bldgs. Size of bins varied, some were 12'x12'x4', others were 3'x10'x9'. All such bins had 3" to 4" air spaces underneath and on 3 sides.

Fair = Stored in crates in rooms with low ceilings and poor ventilation. Crates not spaced. Too warm as indicated by sprouting carrots in uppermost crates.

Poor-fair = Covered baskets stacked 12 high in low ceiling building insulated with baled hay. Air inlets and outlets not provided.

Very poor = Stored in bulk 4 to 5 ft. deep, wet rooms, little ventilation and roots very dirty.

[b] Percentages based on random sampling. Figures in "Totals" column equal sum of figures under "Pathogens". Fusarium not seen in these storages.

Five cold storage plants, one each in Savannah, Newark, Clyde, Marion and Fairport, New York were visited. These plants housed a total of approximately 18,000 crates of celery (see Table 3). About 4/5 of the celery seen was of the so-called self-blanching type, the remainder was the green or Paschal type. A considerable part of the self-blanching celery was the Cornell No. 19 variety. The bulk of the celery seen was stored during the last 2 weeks of September and the first 2 weeks of October.

The cold rooms in which celery was stored were cooled with compressor systems and the coils were installed overhead in all cases. These rooms were also provided with vents to allow the escape of warm air. Temperatures ranged from 30.5° F. to 34° F. and the relative humidity from 84 to 92% (see Table 3).

There was considerable variation in methods of ventilating the individual crates of celery in the different plants. Crates were stacked in tiers 4 to 12 crates high. In all plants, 2-inch strips were placed between each layer of crates but in only 2 of 5 plants was there a substantial air space provided between each tier of crates. Usually the crates stood in solid blocks 4 to 6 crates wide.

Approximately 1/4 of the crates of celery contained many rotting bunches. There was practically no rot in the Paschal type celery. The percentage of crates containing rotting celery ranged from 2.5 in one plant to 36 in another. The organisms involved in order of decreasing destructiveness were: Sclerotinia sclerotiorum, Botrytis spp., Ansatospora macrospora (new celery pathogen described by A. G. Newhall), Erwinia carotovora, and Septoria (the latter fungus occurred in the form of clusters of pycnidia on the fleshy petioles).

The chain of conditioning factors which favored the widespread destructiveness of Sclerotinia and Botrytis, in the cold storage plants visited, doubtlessly had its beginning in the fields where the celery was grown. Weather conditions shortly before harvest favored the development and dissemination of inoculum. Much of the celery was of a susceptible type. Owing to the lateness of the planting season and a desire on the part of the growers to produce more, much of the celery was forced and so it was watery and succulent. Because of a labor shortage some of the celery was over-ripe when harvested. Also, when labor was available the crop had to be harvested rapidly. Workers were careless in packing the bunches in crates and much of it was damaged and dirty. The storage plants were forced to receive large quantities within a short space of time and this resulted in slower cooling and allowed time for the principal rotting agents to establish themselves. Once these organisms become established it is possible for them, during long periods of storage, to cause much destruction at temperatures between 32° F and 42° F. It is interesting to note in Table 3 that the least amount of rot occurred in a storage room held at a temperature of 30.5° F. At the latter temperature some of the celery petioles at the periphery of the crate were frozen but this damage was slight compared with the destruction wrought by the rotting organisms at slightly higher temperatures.

Table 3. Celery: Storage and storage rots in cold storage in New York, December, 1943.

Location	No. of crates stored	Storage conditions				No. crates with rotting bunches	Pathogens [f]					Probable loss in per cent
		Date stored	Ventilation	Temp. °F.	Pct. Humidity		Erwinia carotovora	Botrytis spp.	Sclerotinia spp.	Ansatospora macrospora	Septoria spp.	
Savannah[a]	6000	Late Sept. to early October	Fair	32.4 to 33.5	89 to 90+	2200	x	xxx	xxx	xx	trace	36
Newark[b]	5000	Sept. 10 to Oct. 21	Fair	32 to 33	89 to 92	1600	x	xx	xxx	x		32
Clyde[c]	2100	Sept. 5 to Nov. 6	Good	32 to 34	85 to 89	100	x	xx	xxx	x		5
Marion[d]	2000	Sept. 15 to Oct. 15	Good	30.5	84	50	trace	x	xx	trace		2.5
Fairport[e]	3000	Sept. 12 to Oct. 16	Fair	31.5 to 33	89 to 91	500	x	xxx	xxx	trace		16.0

[a] Rotting celery mostly Cornell No. 19, a blanching type. Green Paschal type was not rotting. Crates stacked 4 to 6 high with 2" air space between each layer of crates. Most of the rotting celery was in a room directly over stored onions and connected by means of a slatted floor. There was little rot in celery stored in a room with apples and carrots.

[b] Crates stacked 10 high with 2" strip between each layer of crates. Very wet in rooms. Rotting celery mostly Cornell No. 19. Late celery has kept well. Green type not rotting.

[c] Fans operating. Crates stacked 5 high with 2" air spaces on all sides.

[d] Crates stacked in tiers 5 to 12 high with 2" air space around each crate. Celery rotting was Cornell No. 19 and came from one field. Paschal type celery was in perfect condition.

[e] One-half Cornell 19 and 1/2 Paschal. Only Cornell 19 rotting and all from one farm.

[f] Relative destructiveness of the different pathogens is indicated by means of x -- the larger number of x's the greater the destructiveness. Trace indicates that an organism was present but not important.

Cabbage. About thirty thousand acres of cabbage, with an estimated yield of 320,000 tons, are grown in New York State each year. The major part of this tonnage is produced in Ontario, Wayne, Monroe, Orleans and Niagara Counties. Much of this cabbage is processed soon after harvest and a considerable amount is sold as a fresh vegetable on metropolitan markets. Therefore, only a small fraction of the cabbage produced was still to be found in storage during January, 1944 when this survey was made.

The storages visited at Seneca Castle, Binghamton, Albion, Knowlton, Brockport, LeRoy and Fairport (all in upstate New York) housed a total of about 2700 tons (see Table 4). Almost all the cabbage seen was held in common storage in bulk. The most prevalent type of storage house consisted of a frame building within which a series of ventilated bins had been constructed on both sides with an alley in the center. Brief descriptions of each storage visited are given in conjunction with Table 4.

Temperature and humidity varied with outdoor conditions although not so widely. Temperatures recorded in a few storages visited during January show variation from 36° F. to 43.5° F.

The percentage of heads affected by one or more organisms varied from 8 to 100 (see Table 4). Alternaria was by far the most prevalent organism and the figures in the column labeled "total heads affected" are based upon its incidence. Thus if Alternaria was not present, usually there were no other organisms. For example, Table 4 shows that, at Seneca Castle, 7% of the heads were affected by either Botrytis or Sclerotinia or both but these heads and an additional 1% were affected by Alternaria so that the "total heads affected" becomes 8%. Therefore the figures in "total" column correspond in all cases to those in column labeled "Alternaria spp.". Although the incidence of Alternaria frequently was high the actual shrinkage caused by it usually was low. However, it is probable that it paved the way for the more destructive organisms, Botrytis and Sclerotinia. Table 4 shows that from 2 to 15% of the heads were affected by Botrytis, 0.2 to 8% by Sclerotinia, a trace to 3% by Erwinia carotovora, and that occasionally Xanthomonas campestris, Pythium spp. and black speck (physiological) were present. Figures in the right hand column of Table 2 indicate that shrinkage was greatest in those lots having the highest percentages of heads affected by Sclerotinia and/or Botrytis. Also these organisms were more destructive in poorly ventilated, makeshift storages than they were in first-class storage houses. It was inevitable that, under pressure of the times, much space unsuitable for cabbage storage would be pressed into use. It is surprising, therefore, that losses were as low as this survey indicates. It can be stated, however, that the unusually low December temperatures probably helped to prevent large losses in otherwise unsatisfactory storage houses.

Onions. The principal onion growing areas in New York State are located in Orange, Orleans and Madison Counties; lesser acreages are grown in Genesee, Wayne, Oswego and Oneida Counties. The major part of commercial onions is grown on mucklands in the above counties. The commercial crop acreage grown in New York in 1941 was about 13,000 and the yield

Table 4. Cabbage*: Storage and storage rots in New York, January, 1943-44. Common storage.

Table 4. Cabbage*: Storage and storage rots in New York, January, 1943-44. Common storage.

Location	Tons stored	Storage conditions: Type	Ventilation**	Temp F.	Humidity Pct.	Percent of heads affected: Total	Pathogens: Alternaria spp.	Erwinia carotovora	Xanthomonas campestris	Botrytis spp.	Sclerotinia spp.	Pythium spp.	Black speck	Total shrinkage
Seneca Castle	1000	Bulk in bins	good[a]	36		8.0	8.0			5.0	2.0			1.0
Binghamton	35	Bulk	poor[b]	43.5	80	40.0	40.0	1.0		4.0	5.0	trace		3.0
Binghamton	50	Bulk	very poor[c]	---	--	75.0	75.0	3.0		4.0	8.0			4.0
Binghamton	50	Bulk in pit	almost none[d]			10.0	10.0	trace		2.0	3.0			1.0
Binghamton	10	Bulk in pit	almost none[e]			100.0	100.0	3.0		10.0	7.0			10.0
Albion	1000	Bulk in pit	very good[f]	38	--	15.0	15.0			10.0	0.2	trace	trace	1.5
Albion	300	Bulk	poor[g]	38		15.0	15.0		trace	15.0	0.5			4.0
Knowlton	100	Bulk in bins	good[h]	40	84	20.0	20.0	trace		2.0	1.0	trace	trace	1.0
Brockport	100	Bulk	poor[i]	--	--	15.0	10.0	2.0		10.0	5.0		trace	5.0

* All Danish Ballhead except that seen at Seneca Castle, which was Wisconsin Yellows-Resistant.

**a Bins 4' x 12' x 8' with 4" slatted air space on 3 sides with slatted floor underneath. Air vents in sides and roof.

b Piled on floor 4 1/2 ft. deep over area 25' x 35', ceiling 5' to 12'. One air vent in roof.

c Piled 5 ft. deep over large area having low ceiling. No air vents.

d Cabbage was stored in outdoor pit and covered with hay. Stored during cold weather and had kept well. Not wet.

e Stored in outdoor pit - allowed to become wet. Apparently poor field control of insects especially.

f Stored in bins 3' to 4' x 10' x 10' with 3" slatted air space between and at ends and undereath each bin. Air vents in roof.

g Piled 10' deep in a driveway 15' wide and 75' long on earth floor. Low Dec. temperature probably prevented severe loss.

h Bins 3 1/2' x 8' x 10' with 6" air space on 3 sides but not slatted floor. Too warm and moisture, condenses on walls -- probably not good air movement.

i Piled 5 to 6' deep over area 15' by 30'. Dec. cold weather probably prevented heavy losses.

was about 2,500,000 100-pound bags. The 1943 acreage was probably between 13 and 14 thousand but the yield doubtless was less than in 1941 because of rather unfavorable weather prevailing during the growing season of 1943, especially in the Madison County area. Growers in the latter area estimated that their onion fields yielded one-third to one-half less than in normal years.

Considerable quantities of onions were in storage in Orleans and Wayne Counties in December, 1943 and January, 1944 (Orleans County growers and buyers estimated about 400,000 bu. remaining in storage in that area in mid-January, 1944); few were in storage in the Madison County area in December, 1943 (mostly because of the short crop), and very few Orange-County-grown onions were in storage in Orange County late in January, 1944. However, there was a considerable quantity of Orleans-County-grown onions stored in one Orange County cold storage plant late in January, 1944.

Table 5 shows that 11 common storages visited housed about 55,000 bushels, and Table 6, that 7 cold storages visited housed about 225,000 bushels. Almost all onions seen were stored in crates but storage conditions were rather variable especially in common storage houses. Data in Tables 5 and 6 together with footnotes in conjunction with the tables reveal some of the details of storage conditions.

Temperatures in 11 common storage houses ranged from 32.5° F. to 42° F. and the relative humidities from 82 to 91%. In 7 cold storage plants temperatures ranged from 31.5° F. to 34° F. and relative humidity from 81 to 90%. Comparison of data in Tables 5 and 6 show that cold storage permits much less bulb rot than does common storage. Counts showed that the percentage of bulbs affected in the different cold storages ranged from 0.1 to 1.5, while in common storages the range was from 0.3 to as much as 25%. The species of organisms causing rots in cold storage onions were the same as those rotting bulbs in common storage and this indicates that they were brought in from the field at harvest time. Obviously cold storage temperatures were instrumental in suppressing the activities of bulb rot pathogens during the storage period.

The organisms involved in the rots of stored bulbs were: Erwinia carotovora, Aspergillus niger, Fusarium spp., Botrytis (3 species), Colletotrichum circinans, and Penicillium spp. Yeasts were frequently found to be associated with the bacterial soft rot organisms and sometimes they appeared to be the only organism present in rotting bulbs. Urocystis cepulae was found in most lots of stored bulbs but appeared unimportant as a storage pathogen. The organisms most destructive to the bulbs were Botrytis spp. (causing neck rot), Fusarium spp. (causing bulb basal rot) and Erwinia carotovora (causing soft rot). Colletotrichum did not appear to cause any bulb decay.

Another type of trouble frequently encountered in onion bulbs was referred to as "sour skin" by the growers. It appears that this trouble may be related to the onion "breakdown" mentioned in the literature concerned with onion diseases.

In general the most unsatisfactory common storage houses and conditions were encountered in the Rome, New York area. Stored onions seen in the vicinity of Rome had been harvested during wet weather, and placed in storage during warm weather. The storage houses seen were mostly poorly

Table 5. Onions*: Storage and storage rots in New York, 1943-66. Common storage.

Table 5. Onions*: Storage and storage rots in New York, 1943-66. Common storage.

Location	Bushels stored	Storage conditions**			Percent of onion bulbs affected								
						Pathogens							
	000 omitted	Ventilation	Temp °F.	Humidity pct.	*** Total	Erwinia carotovora	Aspergillus niger	Fusarium spp.	Botrytis spp.	Colletotrichum circinans	Urocystis cepulae	Penicillium spp.	Other
Canastota[a]	20	fair	34	82	3.0	1.5	0.1	0.35	0.75	0.1	0.1	0.1	yeasts
Canastota[b]	1	good	42	85	2.5	1.0	0.2	0.5	0.5	tr.	0.1	0.2	yeasts
Rome[c]	0.7	very poor	34	89	15.0	7.0	0.3	4.0	3.0	tr.	0.2	0.5	
Rome[c]	0.7	very poor	33.5	90	15.0	8.0		5.0	2.0	tr.	tr.		yeasts
Rome[c]	0.5	very poor	32.5	84	25.0	10.0	tr.	8.0	6.0		tr.	1.0	yeasts
Binghamton[d]	0.1	fair	35.0	91	4.0	2.0		1.0	1.0				
Albion[e]	1.5	good	35.	84	1.0	0.2	tr.	0.3	0.3	tr.	0.1	0.1	
Elba[f]	15	good	34	89	0.3	0.1	tr.	0.1	0.1	tr.	tr.		alkali spot-tr, sour skin
Elba[f]	3	good	33	88	1.0	0.2		0.4	0.3	tr.	0.1		" "
Durlandsville[f]	5	good	--	--	1.0	0.2		0.5	0.2		tr.	tr.	
Durlandsville[f]	7	good	24	88	1.5	0.4		0.6	0.3		0.1	tr.	
Pine Island[g]	0.5	poor			3.0	1.0		1.5	0.3	tr.	0.1		

* Most of the onions grown in Madison area (Rome & Canastota, NY) were grown from sets except those grown from seed by Smith-Coulter near Canastota, NY. All other listed in the table were grown from seed. All were of the Yellow type varieties.

** All onions seen were stored in crates (see footnote d). Canastota and Rome, NY onions mostly placed in storage in late August to mid-September; the remainder listed in above table mostly stored during late September.

a Building of brick with raised wooden floor and fair ventilation. Crates stacked 9 high.

b Wooden frame bldg. with concrete floor, well ventilated. Crates stacked 8 high and in blocks 10 tiers square.

c Poorly ventilated wooden structure with crates setting on earth floor and stacked 8 to 10 high.

d Placed in storage without topping; in bulk in tight floored bunkers 5' wide by 20' long by 10" deep.

e Wooden frame bldg. with ventilated walls and floor, high ceiling and air exhaust fans. Layers of crates spaced with 2" strips.

f Wooden frame bldg. with ventilated walls and air vents in roof. Layers of crates spaced and stacked 8 to 10 high on concrete floors.

g Stored in basement of barn; crates setting flat on floor and stacked to ceiling; no ventilators.

*** Sum of figures listed under pathogens.

Table 6. Onions*: Storage and storage rots in New York, 1943-44. Cold storage.

Location	Bushels stored 000 omitted	Storage conditions**			Percent of onion bulbs affected								
						Pathogens							
		Ventilation	Temp. °F.	Humidity Pct.	*** Total	Erwinia carotovora	Aspergillus niger	Fusarium spp.	Botrytis spp.(3)	Colletotrichum circinans	Urocystis cepulae	Penicillium spp.	Other
Savannah[a]	20	fair	33	90	1.1	0.3	tr.	0.4	0.3	tr.	tr.	tr.	Skin blemishe
Newark	5	fair	34	81	1.5	0.4		0.5	0.4		0.1		Skin blemishes on many
Albion[b]	15	good	32.5	86	0.1	0.03		0.02	0.05	tr.		tr.	"
Albion[b]	51	fair	31.5 to 32.5	87 to 90	0.5	0.1		0.2	0.1	tr.	tr.	tr.	Sour skin
Albion[b]	17	good	32.5	89	0.3	0.1	tr.	0.1	0.1	tr.	tr.		Possibl alkali spot
Holley	50	good	32.8	85	0.3	0.1	tr.	0.1	0.1	tr.	tr.	tr.	Sour skin
Unionville[c]	72	good	32	89	0.8	0.2		0.3	0.2		0.1	tr.	Sour skin

* Onions all grown from seed and were of the yellow types.

** All onions seen were stored in crates. Mostly placed in storage during late September.

[a] Crates stacked 7 high and 4 wide with 2" space between 4 and 5th layer.

[b] Fans operating to move warm air in upper part of room. Crates stacked 8 high and completely filled rooms.

[c] Clean, dry rooms with high ceiling and air vents.

*** Sum of figures listed under pathogens.

planned frame buildings constructed on the muck, without floors and good ventilation features. Such storage houses were filled with crates (stacked 10 high) of poorly dried onions during rather warm weather. The lowermost crates rested on wooden strips laid on the muck floors but the weight of the mass forced the strips into the soft earth and made it impossible to properly ventilate the crated bulbs. It was in such storages that bulb rots ran to 15 and 25%. Almost without exception the common storage houses encountered in all other onion growing areas appeared better planned than those near Rome, New York. However, the statements of growers in all localities reflected their need and desire for help in the planning and construction of better storage houses.

Squash. Winter squash acreage for New York in 1941 was approximately 1500 with a probable total yield of 15,000 tons. Apparently little of this squash is stored by the growers beyond mid-December for reasons which appear obvious from the information below.

Winter squash, totaling about 50 tons, was examined during the latter half of December, 1943. About 40 tons, consisting mostly of Blue Hubbard together with a small quantity of Table Queen acron squash, were in common storage near Auburn, New York. The remainder, consisting of True Hubbard, was in common storage near Binghamton and Windsor, New York.

Of the Blue Hubbard, and True Hubbard squash examined, about 25% were infected by one or more rotting organisms. Fungi involved in the rots were as follows: Colletotrichum lagenarium, Mycosphaerella citrullina, Fusarium spp. and Rhizopus spp. Because of the rather complex association of the different rotting organisms involved, an attempt was not made to differentiate as to the amount of destruction caused by each.

In addition to the fungi listed, a bacterium was found to be associated with a decay of Blue Hubbard squash. The initial symptoms of this decay were in the form of small hydrotic areas in the edible flesh. These small hydrosed areas appeared to have coalesced in the later stages of decay. Also, small cavities, filled with a white ooze-like substance, were noted in the decaying flesh. External signs and symptoms appear uncommon, thus the trouble may be easily overlooked. The grower of these Blue Hubbard squash revealed that 10 to 15% of the apparently sound fruits exhibited this trouble. Dr. W. H. Burkholder of Cornell is attempting to establish the identity of the bacterium.

Stored acorn squash were found to be destructively affected by Macrosporium (probably M. cucumerinum) [Alternaria cucumerina]. About 75% of the fruits seen were infected. Fusarium spp. often followed after the Macrosporium. About 5% of the acorn squash fruits were affected by Mycosphaerella citrullina.

The storage rots of squash encountered in the different localities had their inception in poor field control of the organisms involved and they were intensified by rather unsatisfactory storage conditions. Special storage conditions were not provided at any of the places mentioned above. In all cases most of the squash was piled 5 to 10 feet deep in barns or sheds without good ventilation features. Air temperature and moisture were allowed to vary regularly with outdoor conditions. In no case had pre-storage treatment of the fruits been attempted.

Beets. Most of the beets grown in New York for processing by canners are produced in Livingston, Ontario (area of heaviest production), Monroe and Wayne Counties. In 1942, these four counties grew about 3800 acres. The variety grown is mostly Detroit Red.

During the survey period (December 15, 1943 to January 20, 1944) a total of about 450 tons of beets were encountered in cold storage at Savannah, and Clyde, while approximately 1900 tons in common storage were distributed in storages at Rushville, Gorham, Marion, Seneca Castle, Binghamton, LeRoy, and Fairport. With the exception of those grown at Binghamton, all were about to be processed in or near the areas where grown.

Cold storage beets were stored in bushel crates at temperatures ranging from 32° to 34° F. and at relative humidities ranging from 85 to 89%. In general, such beets were keeping very well. In crates examined, not more than 0.2% shrinkage due to rotting organisms occurred. Fusarium and Rhizoctonia were obtained from some of the rotting specimens. About 1% of the beets exhibited symptoms of boron deficiency and a few exhibited scab caused by Actinomycetes.

Common storage beets were stored in bulk. At Rushville, about 400 tons were held outdoors in long piles about 4 feet in depth and covered with hay. Practically all of these were solidly frozen and the processed product from these appeared of rather poor quality. A new indoor storage house was being constructed by the processing company concerned. At Gorham and Marion, a total of about 500 tons were stored in basement warehouses. In general these were in good condition except where considerable soil was dumped in with the beets. Where there was much soil the beets were heating. At Fairport, about 400 tons were stored in an old garage insulated with baled hay. Individual bins within, about 20 ft. by 20 ft., were filled to a depth of 10 to 12 ft. and much soil was infiltrated with the beets. Provision for ventilation had not been made and at least 5% of the beets were heating and a complex of rotting organisms was developing.

Of beets in common storage those at Seneca Castle and at Binghamton, were stored under the best conditions. About 600 tons distributed in these towns were held in bins 3 to 4 feet wide by 10 long by 8 feet deep. The bins were constructed of slats with 3- to 4-inch air spaces on three sides and the bottom, with the fourth side facing an alley. The storage houses were furnished with air inlets and outlets. One of those at Seneca Castle was furnished with exhaust fans. Beets stored in such bins were not heating and only an occasional rotting root was noted. Apparently none of the beets were frozen. A few beets showing scab were found in those both at Seneca Castle and at Binghamton. Traces of boron deficiency were noted in Seneca Castle beets. Decay-producing organisms noted in common storage beets were Fusarium, Rhizoctonia, and Penicillium, and very probably there were others.

Parsnips. Few parsnips were seen in commercial storage. At Albion, about 200 bushels, stored in crates, were held in one cold storage plant. These roots were held at a temperature of 32.5° F. and the relative humidity was about 86%. About 0.2% of the roots examined were rotting. Botrytis (cause of gray mold rot) and Sclerotinia (cause of watery soft rot) were the principal rotting agents observed.

At Binghamton, about 800 bushels were held in common storage. These parsnips were stored in bulk in fairly well ventilated bins. The slatted bins were 4 x 10 x 8 feet and were separated from each other by 3-inch air spaces. The roots in the bins rested directly on an earthen floor which was the most unsatisfactory feature of the storage. At the time (Jan. 6, 1944) the temperature in the storage house was 40° F. and the relative humidity was 92%. Air inlets were provided at one end of the building but there appeared to be insufficient provision for air outlets. About 1.5% of the roots were affected by Botrytis which was the only rotting organism seen.

Turnips. About 4000 bushels of white turnips were distributed in storage houses in Albion, Clyde, Fairport and Webster. All were stored in bushel crates, or baskets, and were held under controlled cold storage conditions. Prevailing cold storage temperatures ranged from 31.5° F. to 34° F., relative humidity ranged from 84 to 91%.

Usually the amount of storage rot ranged from none to 0.5%. However, at Clyde up to 8% of the roots in some crates were rotting. The owner of these turnips had withheld them from cold storage until early December and furthermore, these roots exhibited evidences of improper handling. Organisms isolated from different roots and which appeared to be responsible for the rots were: Erwinia carotovora, Fusarium spp., Rhizoctonia spp., Pythium spp., Sclerotinia spp., Botrytis spp. and Penicillium spp.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

STORAGE DISEASES OF POTATOES IN OREGON

Lytton W. Boyle

Three days were spent visiting potato cellars and observing grading operations in the Klamath district of Oregon. This area produced over 5,000,000 bushels of potatoes during the 1942-43 season and will produce a greater amount the current season. Losses in storage and grading during the 1942-43 season were estimate to be 10%. The percentage of loss will be greater this current shipping season. It may reach 20% or more. Netted Gem and Burbank were the principal varieties produced.

A primary cause of loss this season was an early frost and unseasonable wet weather at digging time. Potatoes from certain localities with heavier soil were dirty and had not dried in storage. Digger cuts in many cases were not well suberized. These factors aggravated the loss due to rot.

Dry rot was the more prevalent type. Exceptions to this were noted in a few cellars where humidity and temperature had obviously not been properly controlled by ventilation. Mold was very evident on the lumber of the superstructures in such places and wet rot was the more prevalent type. From the gross appearance, Fusarium sp., Pythium sp. and bacteria were primarily responsible for the rots. Dr. Milbrath is making a more careful study of selected specimens to determine more specifically the organism responsible for the rot in each instance.

Net necrosis (virus) caused complete loss of certain lots of potatoes. The tubers appeared sound but there was no possible way to grade these and obtain the tolerance allowed for any market grade. These lots were of the Netted Gem variety. According to the observation of certain growers the prevalence of this disease was correlated with the seed source. Whether the current infection was from unobserved infected seed pieces or from unsuspected weed hosts is a question for further observation and study.

Ring rot (Corynebacterium sepedonicum) was not found in the limited number of samples collected or observed. According to members of the staffs of regulatory agencies in this area, this disease occurs but has not as yet attained the serious proportions that it was feared it might by this time. The producers seemed generally aware of the seriousness of this problem and have been cooperative to prevent its spread if possible.

Scab (Actinomyces scabies) was prevalent in the southern part of the district near Malin. Scab was evident on every tuber in some lots. In others, the disease could be found on only a small percentage of the tubers. Data regarding the control practices used in each instance were not available.

Rhizoctonia solani was evident in some lots of seed. No badly infected lots were noted in these larger storage cellars.

EMERGENCY PLANT DISEASE PREVENTION PROJECT. January 25 - February 1.

SWEETPOTATO STORAGE DISEASES IN NORTH CAROLINA

R. E. Atkinson

Farm storage houses and storage pits were inspected in Harnett, Sanford, Lee, Richmond, Columbus, Carteret, Pitt, Nash, and Warren Counties of North Carolina. Commercial storage houses in the largest sweetpotato shipping center in North Carolina, Tabor City, were also visited.

Soft rot (Rhizopus nigricans, and Mucor sp.). The most common storage trouble was soft rot which caused damage varying from 1 to 5% in most houses. Most growers, using tobacco barns for storage, had cured their sweetpotatoes; in some cases a slight shriveling at the ends indicated that too high temperatures were used. In large, hard to heat storage houses, 5 to 10% rot was found, and in one lot of late harvested roots said to have been "chilled" before curing, fully 25% were affected by soft rot.

Surface rot (Fusarium sp.). This rot was also very common and varied greatly in amount between growers. The inadequate supply of labor was blamed for much of the bruising and the resulting surface rot. Growers were forced by the labor shortage to use untrained help, in many cases children, for much of the harvesting. Roots with surface rot were not being discarded. Because of the demand, few shippers were grading carefully. Sweetpotatoes with bad surface rot were put with the No. 2's and sold for drying.

Scurf (Monilochaetes infuscans). Very little scurf was seen. The worst was in a lot being washed before shipping, with 25% scurf. Another lot

ran about 5% scurfy. Probably most of the scurfy roots were not stored but sold last fall.

Black rot (Ceratostomella fimbriata). The worst lot of black rot was found in a commercial storage house. Only 1% of the sweetpotatoes had black rot. In a farm storage a high percentage of infected roots was found in a pile of culls.

Wilt (Fusarium spp.). Occasional sweetpotatoes with black vascular bundles near the stem end were suspected of having wilt. Only 3 farms of those which applied for certification in North Carolina were free from wilt last year.

Unidentified Disease. A frosty white mycelial growth on the surface of sweetpotatoes has been observed in many localities of North and South Carolina. The mycelium apparently whitens the skin giving it a blotched appearance. The mycelium resembles that of Rhizoctonia. Specimens have been sent to Dr. Leland Shanor for culturing.

Notes on Sweetpotato Storage. Many growers try to cure sweetpotatoes without heat, that is, they utilize the high temperatures of late fall to hold the storage house above 70° for 2 or 3 weeks. This method is effective in most years, but perhaps the early cold wave this year prevented adequate curing. At any rate storage rots are said to be considerably higher this year than in previous years.

A shipper in Columbus County in loading 2-1/2 cars from storage (1300 bushels) discarded 250 bushels of rotted sweetpotatoes. Another shipper reported the sweetpotatoes he had stored were running 80% No. 1 and No. 2. Most of the balance were discarded because of rot. One lot he had purchased from a grower ran 60% No. 1 and No. 2.

From this survey I received the definite impression that the chief trouble with farm storage is not lack of proper curing but chiefly the failure to maintain the proper temperature in the storage houses throughout the winter. This week was a cold one and it was almost possible to predict the amount of rot present when one stepped into the storage house. Heated houses had little rot; unheated houses with temperatures in the 30's had a high percentage of rotten sweetpotatoes.

Incidentally, all diseases including the wilt previously described were identified by growers and shippers as "cold hurt".

EMERGENCY PLANT DISEASE PREVENTION PROJECT.

OTHER REPORTS ON STORAGE DISEASES OF VEGETABLES, including

STORAGE DECAY OF CARROTS IN OREGON. In the Klamath district carrots were stored in the same cellars with potatoes in a few instances and were not keeping well. It appears that conditions maintained for the storage of potatoes are not optimum for carrots. Carrots were less dormant than is desirable. In some instances, the roots had been run over the grader twice so far, in an attempt to remove and check loss due to rots. Losses of 30% were observed. The ultimate loss will depend upon how readily the carrots may be moved either to market or to more suitable storage. This crop is not ordinarily grown in this district, but was produced as part

of a war project. -- Lytton W. Boyle, Emergency Plant Disease Prevention Project. January 26 - February 2.

SEED POTATO INSPECTION IN LOUISIANA: At Monroe in northern Louisiana, in company with Mr. R. D. Olsan, District Entomologist, samples of a total of 4 carloads of potatoes to be used for seed this spring were inspected, particularly for ring rot (Corynebacterium sepedonicum), which was not found. In a shipment from Minnesota of the Bliss Triumph variety, scurf (Rhizoctonia solani) was noted on all the potatoes examined, and there was also a very small percentage of scab (Actinomyces scabies). -- Douglas C. Bain, Emergency Plant Disease Prevention Project. January 23 - 29.

POTATO RING ROT IN OHIO: Several lots of potatoes, totalling about 2000 bushels, grown from certified seed last year were examined for the presence of disease. No ring rot was found in any of these lots. One lot of several hundred bushels which was 2 years from certified seed was heavily infected and the loss will average more than 10%. -- M. R. Harris, Emergency Plant Disease Prevention Project. January 24 - 29.

STORAGE DISEASES OF SWEETPOTATOES IN MISSISSIPPI AND LOUISIANA: Brief inspections were made of seed sweetpotatoes in storage on several farms just north of Meridian. The writer was accompanied by Mr. J. P. Tingle, one of the Mississippi State Plant Board Inspectors. The sweetpotatoes appeared to be in very good condition. There was only a trace of soft rot (Rhizopus nigricans). A trace of what appeared to be soil rot (Actinomyces ipomoea) was found on one farm.

In the storage house of the Laurel Starch Co., at Laurel, most of the sweetpotatoes were in fairly good condition. Two lots amounting to several hundred pounds, belonging to 2 different farmers were considerably damaged, apparently because of cold weather and freezing prior to storage. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. February 6 - 12.

SWEETPOTATO STORAGE DISEASES IN LOUISIANA: A very high percentage of Rhizopus soft rot was found in sweetpotatoes stored by the Warriner Starch Co., near Oak Ridge. This store house has a capacity of about 375,000 bushels, and it appeared to be about 2/3 full. Loss due to soft rot this year probably will be considerable. Relatively small amounts of soil rot and black rot were also present in the crates examined. In smaller storage houses on farms in West Carroll Parish, from 2 to 4% of the roots were affected by soft rot, up to 10% by black rot and soil rot, and in one storage house there was a very small percentage of scurf (Monilochaetes infuscans). -- Douglas C. Bain, Emergency Plant Disease Prevention Project. January 23 - 29.

STATUS OF TOBACCO BLACKSHANK IN NORTH CARCLINA

T. E. Smith

Strains of tobacco resistant to blackshank (Phytophthora parasitica var. nicotianae Tucker) were released for general use in the 1943 crop. Approximately 3000 acres of Oxford 1, 2, 3, or 4 (Bullock and Moss, U. S. Dept. Agri. Circ. 682, 1943) were grown. Quality of the cured leaf was excellent even though seasonal conditions were generally unfavorable. Farmers obtained outstanding results over a large area of the State. Oxford 1 produced 800 pounds of tobacco per acre in 1943 on one badly contaminated farm in Forsyth County where one of the regular varieties produced slightly less than 100 pounds per acre in 1942.

Resistance to blackshank was adequate in most cases. In some instances, however, as much as 20% loss of plants occurred where seedlings were grown on blackshank-contaminated beds or set in fields where tobacco was badly diseased in 1942. In such fields the period of maximum loss occurred shortly after the plants were set. This experience indicates a lower degree of resistance when the plants are small and points to the need for continued use of sanitary practices to lessen chances of infection during the earlier stages of growth. Best results both in quality of the crop and blackshank control were obtained where the resistant strains were grown on soil rotated to other crops for 2 or 3 years.

Observations in North Carolina tend to support the suggestion of Vaughan (PDR 27:643-645, 1943) that wind-borne inoculum may be responsible for spread of blackshank. In 4 new outbreaks in Person and Granville Counties, North Carolina, it has not been possible to explain satisfactorily the occurrence of the disease by movement of infected plant material or contaminated soil. In 1941, leaf and stem lesions due to blackshank infection were found abundantly in a few fields where root decay on other plants indicated the presence of soil-borne inoculum. The leaf and stem lesions often occurred near the top of the plant and infection from spattered surface soil seemed unlikely. Hence, there is evidence that under favorable conditions blackshank spreads by air-borne inoculum for short distances.

Blackshank was found in Granville County for the first time in 1943, having previously been reported from Forsyth, Stokes, Surry, Yadkin, Davidson, Guilford, Rockingham, Caswell, Alamance, Person, and Pitt Counties growing one-fourth the North Carolina acreage. Blackshank-resistant strains are susceptible to Granville wilt (Bacterium solanacearum E.F.Sm.) which is widespread in a part of this area, particularly in Granville, Person, and Pitt Counties. The occurrence of both diseases in the same area presents a serious problem. Varieties resistant to wilt are in prospect for the immediate future but resistance to both diseases are not available within one commercially usuable strain.

DIVISION OF TOBACCO INVESTIGATIONS, U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AND NORTH CARCLINA AGRICULTURAL EXPERIMENT STATION, OXFORD, NORTH CAROLINA

CROWN GALL AND IRRIGATION WATER

C. C. Smith and L. C. Cochran

The repeated occurrence of endemic outbreaks of crown gall in stone fruit nurseries on land with no recent orchard or nursery history has been the cause of serious losses that have heretofore been unaccountable. Data are presented here to show that irrigation water can carry the crown-gall organism [Agrobacterium tumefaciens] in sufficient quantity to cause infection of a high percentage of peach seedlings, and that it may be an important factor in dissemination in nurseries and orchards where furrow irrigation is used.

In 1941 the junior author (3) reported a case of heavy crown-gall infection in experimental nurseries on land which had previously been cropped to grain and which had had no orchard history for about 40 years. Hildebrand (4), commenting on this report, pointed out that evidence was well established that the crown-gall organism could live, as a maximum, not more than 2 years in soil in the absence of host plants. Subsequent examination of the facts surrounding this case revealed that the nursery was infected by contaminated irrigation water applied at the time of planting to settle the soil around transplanted stock and seeds. Although this water originated in mountain reservoirs and deep wells, it passes in a main conduit directly under a section of peach orchards some five miles from the nursery planting. Inquiry revealed that a section of this main conduit under the orchards had been replaced and the surface drainage water from winter rains on the orchards had been allowed to enter the pipe just prior to the time the nursery was planted. The water used to settle the soil around the seeds and transplanted trees in the nursery was the first to pass through the conduit following the repairs.

In 1941 the nursery was expanded on to grain land not previously receiving irrigation. Water from the same source as that used in 1939 was applied to settle the soil around transplants. Inquiry showed the water to come direct from mountain reservoirs and wells, with no history of passing through faulty pipe or pipe under repair. Examination of seedlings and transplants in 1942 showed the 1941 planting to be largely free from crown gall. Seedlings grown in potted soil taken from adjoining grain fields not receiving irrigation water developed no crown gall. This evidence makes it fairly clear that the report made in 1941 (3) was a case of contamination and not persistence of the crown-gall organism in soil.

In 1943 another disastrous experience with crown gall was encountered in a nursery established at the Citrus Experiment Station at Riverside, California. Germinating peach seeds were planted in the nursery row in the spring of 1942, the seedlings to be later budded with standard varieties. At the time when they were dug in February, 1943, they were found to be upward of 75% infected with crown gall. The land had not previously been in orchard for several years and irrigation water came from storage reservoirs which were in turn filled from mountain and deep well water from the Gage Canal. Further inquiry revealed the practice of returning runoff irrigation drainage water from a sump to the reservoir as

a supplement to the Gage Canal source and that part of this water passed through furrows in an old prunus stock orchard and a bearing peach orchard, in both of which crown galls on some of the trees were clearly evident.

To ascertain the possibility of infection of artificially uninjured peach seedlings by the crown-gall organism carried in water, an infection experiment was set up in March, 1943, as follows:

Five-gallon tin cans were filled with soil that had previously been sterilized with chloropicrin gas. Peach seeds were taken from cold storage and when they had begun to germinate enough to crack the pits, 25 seeds were selected and planted in each can. Freshly dug crown galls on peach roots were placed in water and allowed to stand over night. The following morning the galls were removed and approximately one quart of the water was poured over the surface of the soil in each of 6 separate cans in which the seeds had been planted. Three cans were watered with domestic tap water for controls. Tap water was used to water all the cans during the remainder of the growing season. The resultant peach seedlings were removed and examined in January, 1944. The results are summarized in the following table:

Can No.	Treatment	No. of trees with galls	No. of trees without galls	Percentage of trees infected
13	Control	2	17	
14	"	2	21	Av. 7.5
15	"	1	23	
17	Wash water from peach crown galls	12	7	
19	"	10	6	
21	"	6	8	Av. 54.4
23	"	13	10	
25	"	7	11	

The infection on 5 of the control trees is unaccounted for but could have resulted from contamination by splashing of water, since the cans were adjoining during the growing season.

Bainfield (1) found the crown-gall bacteria to be rapidly dispersed from the surface of apple and tomato gall tissue when immersed in water. Banfield and Handenburg (2) showed that healthy raspberry plants, when heeled in soil adjacent to galled plants, rapidly contracted the disease. Numerous records in the literature show the crown-gall organism to be existent near and on the periphery of the galled tissue and to be able to live for several months in the soil. It is not surprising then that when water passes over galled tissue, the water should become a medium of dispersal. The evidence presented here indicates that contaminated water, where furrow irrigation in stone fruit nurseries and in bearing orchards is practised, may be an important agent in disseminating crown gall.

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UNIVERSITY OF CALIFORNIA CITRUS EXPERIMENT STATION, AND U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES.

FURTHER RESULTS WITH METAL DIALKYL DITHIOCARBAMATES FOR THE CONTROL OF THE APPLE BLOTCH FUNGUS

John C. Dunegan

Continuing the apple blotch control experiments reported previously (PDR 27:101. 1943) replicate plots of Ben Davis apple trees near Fayetteville, Arkansas were sprayed 7 times during 1943 with metal dialkyl dithiocarbamates. In one group of plots the iron (ferric) salt was used at the rate of 2 pounds to 100 gallons of water and in another group the lead salt was used at the same rate.

The results (Table 1) show that both the ferric and lead dimethyl dithiocarbamates gave satisfactory control of the apple blotch fungus [Phyllosticta solitaria]. The slight differences in control between the ferric and the lead dimethyl dithiocarbamate plots are not statistically significant.

Table 1. Apple blotch control obtained with metal dialkyl dithiocarbamates in 1943.

Treatment	Percent blotch infected fruit			
	A Block	B Block	C Block	D Block
Ferric dimethyl dithiocarbamate	0.2	4.5	0.1	0.07
Lead dimethyl dithiocarbamate	4.3	1.8	0.2	0.1
Check - no fungicide	39.6	40.7	3.1	9.9

The results obtained in 1943 strengthen the suggestion advanced previously that ferric dimethyl dithiocarbamate probably can be used as a

substitute for bordeaux mixture for the control of the apple blotch fungus, but it should be emphasized that in both years infection was not heavy even on unsprayed trees. It appears likely from the 1943 results that the lead salt also can be used with equal effectiveness.

U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, IN COOPERATION WITH ARKANSAS AGRICULTURAL EXPERIMENT STATION.

CONDITION OF THE CITRUS GROVES IN THE SALT RIVER VALLEY, PHOENIX, ARIZONA

Wm. G. Hoyman

Approximately 12,000 acres of grapefruit and 7,000 acres of oranges are grown in the Salt River Valley, Phoenix, Arizona. Lemons, tangerines and limes are of minor importance as commercial crops. Many groves have been observed during January and February, 1944, and the observations indicated that parasitic diseases were not very prevalent. Of the parasitic diseases, brown rot gummosis (Phytophthora spp.) was the most common and has been observed doing slight to very severe damage on a few trees in 8 groves. According to some of the growers, this disease was first noticed during the winter of 1940-41 when the rainfall was considerably more than usual. Only a small percentage of the previously affected trees have active cases of this disease. Fusarium dry root rot (Fusarium sp.) was found in 3 groves doing considerable damage on a few trees. A parasitic disease of minor importance affecting fruit was that caused by Alternaria citri. This was most common in the navel orange causing an internal black rot usually detectable only by the premature coloring of the fruit. Alternaria infection was also found in burrows of the orange worm in several navel orange and in 2 grapefruit plantings. Psorosis A was observed on a few trees in 4 groves; the most serious cases being on trees over 20 years old.

Of the deficiency diseases, nitrogen deficiency was very common. The failure of many growers to have applied adequate fertilizers may be attributed to the low citrus prices prevailing a few years previous to the outbreak of the war. The present prices have created more interest in proper grove management. Zinc deficiency was not very common on orange trees and seldom seen in grapefruit groves. Iron deficiency has been observed on the new growth occurring on grapefruit but it has seldom been observed on orange trees. Most growers do not consider it as being of sufficient importance to use an iron-containing fertilizer.

In contrast to the deficiency disease, one grove containing 160 acres of grapefruit showed slight damage due to excess boron. This entire grove was irrigated with pump water and an analysis[1] of the water from the 3

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[1] The analysis was made by Prof. H. V. Smith, Dept. of Agri. Chemistry and Soils, University of Arizona, Tucson, Arizona.

wells indicated the boron content was above the amount known to cause injury. According to the grower, various fertilizer treatments have failed to remove the excess boron symptoms prevalent on the grapefruit leaves. An excess of chlorides has been observed causing slight damage in many grapefruit groves. In several instances, grapefruit and orange trees have been seen growing in the same grove; the former may have shown high chloride injury but the latter were seldom affected.

Citrus decline has been observed in a few of the older groves. Most of the groves suffering from this condition were removed during the past few years when low prices prevailed.

Gophers have actually killed more citrus trees than any one parasitic disease. The roots of many trees have had the bark removed from a sufficient number of the larger roots to cause death. In some instances, the bases of the trunks have been completely girdled.

Another injury of much concern to citrus growers is that caused by thrips. Although some growers reduce the amount of injury by spraying, the damage done by these insects to the leaves and fruits can be found in any grove in the Salt River Valley. Observations indicated that thrips injury was less on grapefruit than on orange trees.

In conclusion, the results of this survey indicate the citrus growers of the Salt River Valley have 2 main problems. First, and probably the most important, is adequate fertilization with emphasis on nitrogen. The other problem concerns the control of thrips. Although tartar emetic is available, many growers indicate it will not be possible to rent or purchase a sprayer.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

SURVEY TO DETERMINE BROWN ROT ORGANISMS ON STONE FRUITS IN CENTRAL CALIFORNIA

Horace L. Barnett

During the week ending January 15, a trip was made in the company of Dr. M. W. Gardner and Dr. C. E. Yarwood to the Hollister-Gilroy area as a preliminary to surveys this spring on the brown rot and green rot problems on stone fruits, especially on apricots in this area. Both diseases were severe in this region last year. Areas where sclerotia of the green rot fungus, Sclerotinia sclerotiorum, had been sown in orchards were examined for apothecia but none were found; in an orchard where sweetclover was heavily infected with the organism last year no apothecia were found at this time.

Many brown rot mummies and twig cankers were present in apricot and prune orchards. A limited number of collections were made and the results of cultures showed that both Sclerotinia [Monilinia] laxa and S. [M.] fructicola are present in this region, with S. laxa predominating. Nine cultures of S. laxa and one of S. fructicola were obtained.

During the week ending January 22, collections of mummies were made from a number of apricot, peach, and prune orchards in San Mateo County near Palo Alto, and near Mountain View in Santa Clara County. New conidial tufts are now being produced on some of the mummies in the orchards in

this area. Cultures made from conidial tufts on the mummies collected showed that S. laxa is the predominant fruit rotting pathogen in this section. All of the 11 cultures from apricot proved to be S. laxa, likewise all of the 13 cultures from prune. From peach, 6 cultures produced S. laxa, and 3 from the same orchard were S. fructicola.

During the week ending January 29 a trip was made to the Brentwood area. Apricots and almonds are the chief stone fruits grown here. In general, a light brown rot twig infection occurred throughout the area, but a few orchards of both apricot and almond showed heavy twig infection. In these orchards, many of the twig cankers had been left in the trees after pruning. Very few mummies were found in the apricot orchards, probably partially owing to the light fruit crop of last season. More mummies were found in the few peach and nectarine orchards in the region. In one somewhat neglected old nectarine orchard there was an abundance of brown rot mummies both on the tree and on the ground. This orchard should furnish an excellent opportunity later in the season for observing what part, if any, the apothecia take in infection of these fruits in this region. Following the general plan to collect brown rot mummies of stone fruits from various parts of the State for culturing to determine the relative importance of the 2 fungi in the different areas, numerous mummies were collected here. All isolations from mummies of apricot, peach, and nectarine yielded S. laxa. No culture of S. fructicola was obtained from this area.

During the week ending February 12, brown rot mummies were collected from prune, apricot, and peach orchards throughout the Santa Clara Valley, in the southern portion of Alameda County and in Santa Clara County. It was noted that 1943 blossom and twig infection had been heavy on prune in the western part of the Valley, especially west of San Jose, and also on prune and apricot in the area of Centerville and Irvington. In the central and eastern parts of the Valley a smaller amount of 1943 infection was seen. Apparently, in these latter regions, moisture conditions and use of better control measures were not so favorable for the development of the disease. Cultures from the mummies collected gave the following results: all 19 cultures of apricot, S. laxa; all 22 cultures of prune, S. laxa; 2 cultures from one peach orchard, S. laxa; 5 cultures from a second peach orchard, S. fructicola.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

OTHER REPORTS ON DISEASES OF FRUIT CROPS, including

DIAMOND CANKER ON PRUNE IN CENTRAL CALIFORNIA. The diamond canker virus disease was found on several trees in one prune orchard in the Hollister-Gilroy area. Most of the diseased trees were severly damaged.--Horace L. Barnett, Emergency Plant Disease Prevention Project. Week ending January 15.

STRAWBERRY DISEASES IN MISSISSIPPI. At Meridian, inspections were made of some of the larger strawberry plantings, with Mr. N. R. Loomis of the U. S. Dept. Agr. Horticultural Field Station. Formerly, over 200 acres

wells indicated the boron content was above the amount known to cause injury. According to the grower, various fertilizer treatments have failed to remove the excess boron symptoms prevalent on the grapefruit leaves. An excess of chlorides has been observed causing slight damage in many grapefruit groves. In several instances, grapefruit and orange trees have been seen growing in the same grove; the former may have shown high chloride injury but the latter were seldom affected.

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STRAWBERRY DISEASES IN MISSISSIPPI. At Meridian, inspections were made of some of the larger strawberry plantings, with Mr. N. R. Loomis of the U. S. Dept. Agr. Horticultural Field Station. Formerly, over 200 acres

had been planted to strawberries in this area, but in the past few years the acreage has dwindled to slightly more than 25. Labor shortage and drought have contributed, but the principal cause has been a disease which affects the crown and prevents the flower buds from developing normally, manifested as a dry rot of the scales and flower buds in the crown. According to some of the growers, later in the spring or early summer the plants produce normal leaves and stolons; only rarely is the plant entirely killed. The disease is known locally as "old dog". Certain growers have attempted, apparently without effect, to avoid the disease by using ground on which strawberries had not been grown previously.

The symptoms of the disease are very similar to those described by A. N. Brooks (Phytopath. 25:965-966. 1935) for the bud-rot disease caused by Rhizoctonia sp. Typical mycelium of Rhizoctonia was found on material placed in a moist chamber. Nematodes were found in the scaly tissue of the crown but none were seen in sections made from the crown tissues.

In one field fully 30% of the plants were thus affected. The variety Klondike was the only one in which this condition was observed. This is the principal variety grown in this area, although there are also several acres of Fairmore.

Leaf spot (Mycosphaerella fragariae) was rather severe, particularly on the older leaves; none was observed on the youngest leaves. All plants of the Klondike variety seen were infected. Apparently no effort has been made to control it. A trace of scorch (Diplocarpon earliana) was seen, also on Klondike. Plants of the Fairmore variety were practically free from leaf spot diseases. -- Douglas C. Bain, Emergency Plant Disease Prevention Project. February 6-12.

LEAF SCORCH ON STRAWBERRY IN TEXAS: Less than an acre of young plants was seen at League City, Galveston County. Leaf scorch was present on nearly all leaves but was causing slight damage thus far. -- G. M. Watkins, Emergency Plant Disease Prevention Project. January 24-26.

REPORTS ON DISEASES OF CEREALS, GRASSES, AND FORAGE CROPS

CONDITION OF STORED GRAIN AND SOYBEAN SEED IN IOWA: During the period ending February 5 observations were made on stored grain in Hamilton, Webster, Calhoun, Pocahontas, Buena Vista, Cherokee, Ida, Sac, Carroll, Greene and Boone Counties. Data were collected on oats, corn and soybeans. Samples were collected from each of the crops in previously determined areas in each county. In consultation with the Statistics Department of Iowa State College a method was arrived at by which the areas for sample selection were randomized in such a way that the data secured may be subjected to statistical analysis and it is hoped that this may prove a reliable method.

Germination and the percentage of disease among the seed are being determined for the oats and soybeans. The moisture content and the number of diseased kernels, especially those infected with the dry rots, are being determined for the corn.

Previous to the survey, reports from the farmers in Buena Vista, Cherokee and Sac Counties were that the cattle in some instances were refusing to eat oats. This indicated that the trouble might be scab. When farmers living in the areas selected for sampling were questioned, in only one instance was it found that the cattle and horses actually refused the grain. Samples of the oats from this farm are now being tested and studied for fungi. From the evidence secured it appears that there is very little evidence, if any, that scab is the cause of the cattle refusing to eat the grain. It would appear that in a few cases the ordinary molds have become unusually abundant due to the heavy rains of last fall at harvest time.

Field observations of ear rots of corn agree with those reported by Dr. C. M. Nagel for the period December 6 - 18, 1943. Complete reports of germination and disease found in the samples will be made as fast as they can be secured. -- Edgar F. Vestal, Emergency Plant Disease Prevention Project.

BARLEY DISEASES IN ~~THE LOWER RIO GRANDE VALLEY OF~~ TEXAS: Leaf rust (Puccinia anomala) was present in small amounts in a few fields north of Mercedes. Powdery mildew (Erysiphe graminis) was severe in one small field in the same area, on young seedlings causing yellowing of the foliage. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

DISEASES OF CORN IN ~~THE~~ LOWER RIO GRANDE VALLEY OF TEXAS: Charcoal rot (Sclerotium batatícola) was found in the plants along one edge and at the end of a field of sweet corn south of Weslaco. The bases of normal plants were green with the upper part killed by frost. The bases of the infected plants were brown and brittle with sclerotia beginning to develop in the crown. It was estimated that charcoal rot had killed about 10% of the plants. In an old field of corn near Mercedes, charcoal rot was present in every stalk. The sclerotia were abundant especially below the epidermis, giving the stalk a characteristic green color. Search was made for the Macrophomina phase but it was not found.

Cob rot (Nigrospora oryzae) was present in many of the ears that had been left on the stalks in the field south of Weslaco mentioned above.

Pycnidia of Diplodia natalensis were found at the nodes of dead stalks in a field near Mercedes and at Elsa. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

SCLEROTINIA ON FLAX IN ~~THE LOWER RIO GRANDE VALLEY OF~~ TEXAS: Sclerotinia sclerotiorum was found attacking the root and crown of flax in a field near La Feria. Some of the plants were small; others were larger. One plant partially dead was almost full-grown. The sclerotia were embedded in the root tissue, forming semi-circular bodies just beneath the epidermis. The number of sclerotia ranged from 1 to 4 per plant, and they appeared to be confined to the underground parts of the plant.

It is believed that this is a new record for this fungus on this particular host. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

DAMPING-OFF OF FLAX IN ~~THE IMPERIAL VALLEY OF~~ CALIFORNIA; Damping-off (Rhizoctonia solani) was found to widespread in the Imperial Valley. Practically all of the plantings visited showed a trace to a slight amount. In one field, which had been planted to flax for 3 successive years, approximately 30% of the plants had been killed. The disease was identified by Dr. B. R. Houston, Jr., Plant Pathologist, University of California, Davis. -- E. W. Bodine, Emergency Plant Disease Prevention Project. January 9 - 29.

DISEASES OF OATS ~~IN THE LOWER RIO GRANDE VALLEY OF TEXAS;~~ Crown rust (Puccinia coronata) was found fairly abundantly on the older leaves in 2 small plantings, near Elsa and north of Mercedes. Powdery mildew (Erysiphe graminis) was beginning to appear in the field near Elsa. -- Stuart M. Pady, Emergency Plant Disease Prevention Project.

PLEOSPORA ON LAWN GRASS ~~IN TEXAS:~~ In October 1942, the owner of a new, Kentucky blue grass lawn at Amarillo reported brown spots in the turf that were "four or five inches in diameter" and first noticed in August. A specimen of the turf submitted for examination showed an ascomycete, apparently belonging to the genus Pleospora, sporulating on the dead leaves. In November 1943, a similar case was reported from Seguin, Texas, where the bent grass on golf greens died in "spots about the size of a dollar." A specimen of this trouble was received in good condition and a fungus similar to the one mentioned above was found discharging ascospores from the perithecia imbedded in the dying leaves. In some cases the leaves that showed the fungus in a fruiting condition still retained part of their green color. The spores from the Amarillo specimen now (February 1944) appear somewhat larger than those on the grass from Seguin, otherwise the 2 fungi are practically alike.

The cause of these lawn-grass troubles may be similar to the Helminthosporium-Pleospora fungus mentioned by Clinton (Conn. Agr. Exp. Sta. Bull. 358, Plant Pest Handbook, p. 215) as the pathogen of "lawn rot". It is recalled, however, that the spots on the turf in Connecticut were larger than those reported in the 2 cases in Texas. -- A. A. Dunlap, Texas Agricultural Experiment Station, College Station.

ALFALFA LEAF SPOT ~~IN THE GALVESTON AREA OF TEXAS:~~ Forty acres of alfalfa were examined at Sugarland, Fort Bend County. The plants had received severe cold injury. A trace of leaf spot (Pseudopeziza medicaginis) was present. -- G. M. Watkins, Emergency Plant Disease Prevention Project. January 24 - 26.

COWPEA DISEASES IN ~~THE LOWER RIO GRANDE VALLEY OF~~ TEXAS; In one field west of Mission, cotton root rot (Phymatotrichum omnivorum) was found in small areas of dead plants; southern blight (Sclerotium rolfsii) was present in a small amount, and stem canker (cause not known) was present in a few plots. -- Stuart M. Pady, Emergency Plant Disease Prevention Project. Report for January.

ASCOCHYTA ON HORSE BEAN IN ~~CENTRAL~~ CALIFORNIA. A slight infection of Ascochyta pisi was found on horse bean in the vicinity of San Jose, Santa Clara County. The same disease had also been reported from Kern County on December 20, 1943, by E. W. Bodine. -- Horace L. Barnett and E. W. Bodine, Emergency Plant Disease Prevention Project. Week ending February 12.

FINIS!

JANUARY WEATHER

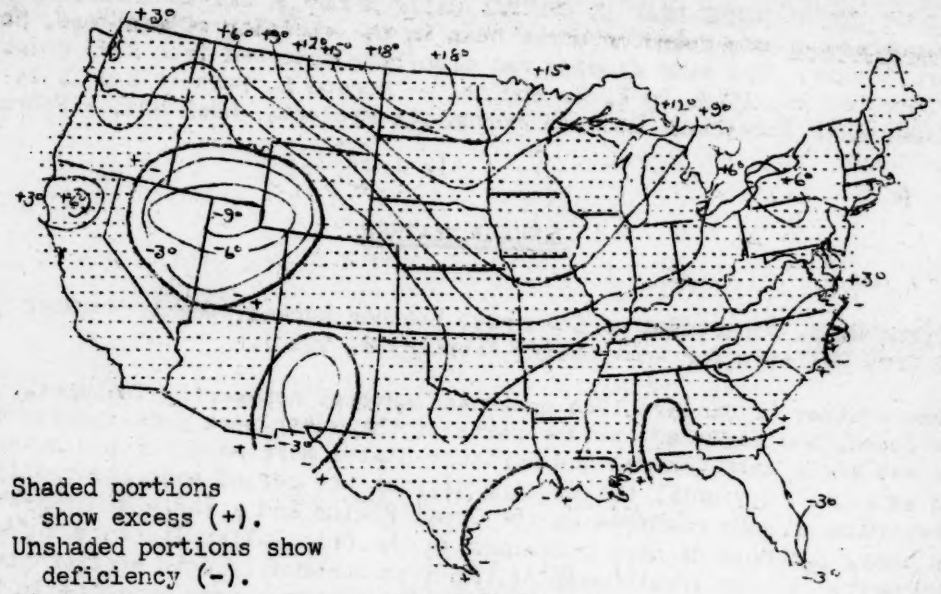
(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for week ending February 8, 1944).

The weather of January 1944 presented several noteworthy features. In the South, the first and middle parts of the month were persistently cold and wet while most Central and Northern States were warm for the season and extremely dry until the closing days of the period when abnormally heavy rain or snow occurred in the Great Plains and a large central-northern area. Extreme dryness continued in the Ohio Valley States and far Northwest. In the Great Basin of the West abnormally cold weather prevailed during most of the month, while temperatures were moderate in the Pacific area.

Map 1 shows that the monthly mean temperatures were above normal everywhere east of the Rocky Mountains, except for slight deficiencies in the extreme South. From the Lake region westward to the Rocky Mountains it was one of the warmest Januaries of record; some northwestern stations reported the highest January mean temperatures of their climatological history. In the northern Plains, extreme upper Mississippi Valley and northwestern Lake region the month averaged from 12° to 18° warmer than normal; in some sections this compared with the normals for March. However, in much of the Great Basin it was 4° to 9° colder than normal. The temperature anomalies for January 1944 were quite similar, both geographically and in magnitude, to those for January 1942, except that minus departures in the Southern States were larger in that year.

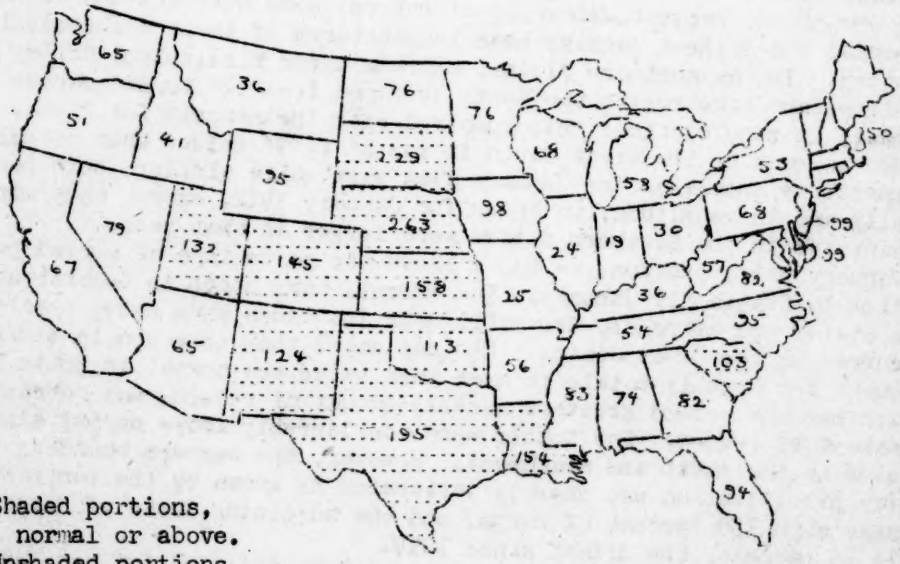
January precipitation. -- Map 2 shows the percentage of normal precipitation by States for January. In general, this month in Central and Northern States was extremely dry until near its close when heavy precipitation occurred in the Great Plains. The map shows that this single storm brought the monthly totals to more than twice the normal in South Dakota, which had the second greatest monthly amount of record, and Nebraska the greatest of record. The totals were considerably above normal also in the States to the south and southwest. However, the eastern boundary of the heavy precipitation was sharply delineated as shown by the contrast between Kansas with 158 percent of normal and the adjoining State of Missouri with only 25 percent, the driest since 1919.

The Ohio Valley States continued dry. Both Ohio and Indiana had the driest January of record and Illinois the driest since 1931. In the Ohio Valley area extremely dry weather has prevailed for 3 months in succession, November - January. In Kentucky the rainfall for this period has been only 51 percent of normal, Ohio 56 percent; Indiana 60 percent and Illinois 66 percent. For these 3 months Kentucky, Ohio, and Indiana have had less precipitation than for any other similar period of record.



Shaded portions show excess (+).
Unshaded portions show deficiency (-).
Lines show amount of excess or deficiency.

Map. I - Departure of Mean Temperature from Normal, January 1944



Shaded portions, normal or above.
Unshaded portions, below normal.

Map. II - Percentage of Normal Degree Days, July 1943 - January 1944